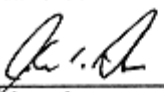


**FINAL
GYPSY MOTH MANAGEMENT PLAN AND ENVIRONMENTAL
ASSESSMENT**

**CUYAHOGA VALLEY NATIONAL PARK
NATIONAL PARK SERVICE
U.S. DEPARTMENT OF THE INTERIOR**

December 27, 2000

Recommended:



Superintendent
Cuyahoga Valley NP

1-25-01
Date

Approved:



Regional Director
Midwest Region

1/17/01
Date

TABLE OF CONTENTS

1. PURPOSE AND NEED FOR ACTION	1
1.1. SUMMARY OF PROPOSED ACTION	1
1.2. PARK PURPOSE AND SIGNIFICANCE	1
1.3. PARK MANAGEMENT OBJECTIVES.....	1
1.4. PROGRAM OBJECTIVES	3
1.5. AUTHORIZING LAWS AND POLICIES	3
1.6. HOW THE GYPSY MOTH AFFECTS THE ENVIRONMENT.....	4
1.7. GYPSY MOTH MONITORING AND MANAGEMENT IN CVNP	5
2. PUBLIC INVOLVEMENT	7
2.1. SCOPING	7
2.2. PUBLIC REVIEW AND COMMENT OF THE DRAFT PLAN/EA.....	8
3. ALTERNATIVES CONSIDERED.....	8
3.1. PROCESS USED TO FORMULATE ALTERNATIVES.....	8
3.1.1. <i>Management Options</i>	8
3.1.2. <i>Management Areas</i>	9
3.2. ALTERNATIVES ELIMINATED FROM DETAILED STUDY.....	10
3.2.1. <i>Use of Diflubenzuron (Dimilin®)</i>	10
3.2.2. <i>Other Gypsy Moth Management Strategies</i>	10
3.2.3. <i>Suppression in Forests Previously Defoliated Only</i>	10
3.2.4. <i>Suppression in Recreational Zones Only</i>	10
3.2.5. <i>Suppression in Buffer Zones Only</i>	11
3.3. ALTERNATIVES.....	11
3.3.1. <i>Alternative 1: No Action</i>	11
3.3.2. <i>Alternative 2: Suppression in Critical Areas</i>	11
3.3.3. <i>Alternative 3: Suppression in All Areas at Risk for Defoliation</i>	11
4. IMPACTS OF THE ALTERNATIVES.....	12
4.1. METHODOLOGY.....	12
4.2. SUMMARY OF ENVIRONMENTAL IMPACTS OF ALTERNATIVES.....	12
4.3. IMPACTS OF THE ALTERNATIVES	14
4.3.1. <i>Impacts of Alternatives on the Biological Environment</i>	14
4.3.2. <i>Impacts of Alternatives on the Physical Environment</i>	20
4.3.3. <i>Impacts of Alternatives on the Social Environment</i>	23
4.3.4. <i>Impacts of Alternatives on the Economic Environment</i>	26
4.4. RECOMMENDATION	26
4.5. MITIGATING MEASURES	28
4.6. PROGRAM MONITORING	29
5. AGENCIES AND PERSONS CONSULTED.....	29
6. PREPARER.....	30
7. REFERENCES.....	30

APPENDIX 1. Summary of Gypsy Moth Public Scoping and Outreach, Cuyahoga Valley National Park, Ohio (1999-2000)	32
APPENDIX 2. Forests on Federal Land Susceptible to Gypsy Moth Defoliation - Cuyahoga Valley National Park, Ohio	35
APPENDIX 3. Identifying Critical Areas for Gypsy Moth Suppression - Cuyahoga Valley National Park, Ohio	36
APPENDIX 4. Butterfly Species List For Cuyahoga Valley National Park, Ohio	47
APPENDIX 5. Compliance Documents and Response to Agency Comments	
APPENDIX 6. Public Comments	

1. PURPOSE AND NEED FOR ACTION

1.1. Summary of Proposed Action

The natural, cultural, recreational and scenic values of Cuyahoga Valley National Park are at risk due to gypsy moth defoliation effects. This Management Plan/Environmental Assessment examines gypsy moth management options, outlines methods for identifying critical management areas, and describes the criteria that will be used for prescribing management actions. Specific management decisions will be made annually by park managers according to the procedures outlined in this document.

1.2. Park Purpose and Significance

Congress created Cuyahoga Valley National Park (CVNP) in 1974 to preserve and protect natural, cultural and scenic resources for the recreational use and enjoyment of present and future generations. CVNP is a National Park Service (NPS) unit encompassing over 33,000 acres of relatively undeveloped land along 20 miles of the Cuyahoga River between the metropolitan areas of Cleveland and Akron, Ohio. Within the legislative boundary, the NPS owns approximately 18,000 acres. The remainder of land is under management by other public or quasi-public entities or remains in private ownership. The resources of CVNP are protected under the authorities of the National Park Service Organic Act of 1916 and Public Law 93-555.

The park harbors more than 19,000 acres of forest, most of which is susceptible to gypsy moth defoliation, including oak-hickory, maple-oak, oak-beech-maple, hemlock-beech, pine-spruce and maple-sycamore forest types. Oak-type forests, the most highly preferred host type for gypsy moths comprise approximately 70% of forest cover. Approximately 11,500 acres of forests susceptible to gypsy moths are federally owned. Other major habitats within the park include old field/scrub, agricultural fields, wetlands, and suburban lands.

CVNP receives more than 3.5 million visits annually, with the highest visitation occurring during the spring, summer and fall months. The park contains many important recreational facilities, including the Ohio & Erie Canal Towpath Trail, over 100 miles of additional trails, several day use areas, two visitor centers, and an environmental education center.

1.3. Park Management Objectives

Guidance on overall management objectives and management policies for CVNP are provided in the National Park Service's Management Policies (USDI, National Park Service 1988), Natural Resources Management Guideline (USDI, National Park Service 1991) and the park-specific General Management Plan (USDI, National Park Service 1977). Much of this guidance relates directly to the management of exotic (non-native) species. All cited policies are in accordance with Executive Order 13112.

It is NPS policy that "management of populations of exotic plant and animal species, up to and including eradication, will be undertaken wherever such species threaten park

resources or public health...High priority will be given to the management of exotic species that have a substantial impact on park resources and that can reasonably be expected to be successfully controlled.” (4:12) (USDI, National Park Service 1988).

Furthermore, parks are advised that “control or eradication will be undertaken, where feasible, if exotic species threaten to alter natural ecosystems; seriously restrict prey on or compete with native populations; present a hazard to human health or safety; cause a major scenic or aesthetic intrusion... or threaten resources or cause a health hazard outside the park.” (2:289) (USDI, National Park Service 1991).

The objectives and policies developed specifically for CVNP that are directly significant to the management of the gypsy moth include:

“To preserve natural park lands under the concept of ‘total environment’ or ecosystems perpetuation and ensure that all visitor-use activities are appropriate to their setting;

To cooperate with federal, state, and local agencies in the monitoring of environmental quality; and

To provide for the safety and protection of visitors, residents and employees.”
(USDI, National Park Service 1977)

One specific policy developed from these objectives states that “noxious or exotic plant and animal species will be controlled or eradicated when deemed undesirable because of danger to public health, safety, or recreational use and enjoyment, or when their presence prevents fulfillment of the requirements of the enabling legislation.” (USDI, National Park Service 1977). The gypsy moth is an exotic species that has the potential to adversely affect healthy functioning ecosystems and public recreation at CVNP.

To further develop resource management objectives for the park, a Resources Management Plan has been written (USDI, National Park Service 1999a). This plan includes park specific goals and objectives. One goal specific to the management of exotic pests states that “Integrated Pest Management (IPM) practices should encourage allowing natural controls to prevent pests from causing intolerable problems for humans, the developed environment, and natural ecosystems.” This objective characterizes the importance of utilizing and preserving natural controls when addressing exotic species issues.

Parks are advised that for widespread exotic species, control programs may need to take a regional approach that may involve other landowners (2:291) (USDI, National Park Service 1991). The monitoring and management of the natural resources of the Cuyahoga Valley region has always been a cooperative effort between numerous agencies and private landholders. Issues such as the gypsy moth infestation cross ownership and political boundaries and underscore the need for cooperative approaches. Efforts to suppress or control the gypsy moth in isolation will be less effective because gypsy moth caterpillars can migrate into treatment areas from adjacent untreated areas.

1.4. Program Objectives

Our program objectives for gypsy moth management stated simply include:

- To reduce the long-term impacts of defoliation to the forest ecosystem and its components.
- To protect the recreational and scenic values of developed visitor use areas and trails from the impacts of defoliation.
- To cooperate with federal, state and local agencies on the suppression of gypsy moths on the lands in and adjacent to CVNP.
- To provide for the health and safety of visitors, residents and employees.
- To preserve natural controls of gypsy moths whenever feasible.
- To implement pest management strategies which are effective and present the lowest risk to people, park resources and the environment.

1.5. Authorizing Laws and Policies

The following laws and policies provide the legal framework authorizing funding and specifying procedures for conducting gypsy moth management activities on federal lands.

The Cooperative Forestry Assistance Act of 1978 provides the authority for federal (U.S. Department of Agriculture) and other agency cooperation in management of forest insects and diseases.

The Federal Insecticide, Fungicide and Rodenticide Act of 1947 requires that all insecticides used in suppression and eradication projects be registered with the U.S. Environmental Protection Agency and follow application requirements.

The National Environmental Policy Act (NEPA) of 1969, as amended, requires detailed and documented environmental analysis of proposed federal actions that may affect the quality of the human environment.

The Endangered Species Act of 1978, as amended, prohibits federal actions from jeopardizing the existence of federally listed threatened or endangered species or adversely affecting designated critical habitat. Federal agencies must consult with the U.S. Fish and Wildlife Service to determine the potential for adverse effects. Federal agencies are also responsible for improving the status of listed species.

The National Historic Preservation Act of 1966, as amended, recommends that federal agencies proposing action consult with the State Historic Preservation Officer regarding the existence and significance of cultural and historical resource sites.

Executive Orders 11988 and 11990 require that federal agencies shall attempt to avoid adversely impacting wetlands or floodplains in meeting objectives. Federal agencies adversely impacting wetlands or floodplains based on an environmental assessment and finding of no significant impact (FONSI) shall release the FONSI for public review (usually 30 days) prior to implementation of proposed actions.

Executive Order 13112 requires that federal agencies act to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause.

Decisions regarding gypsy moth management are made in full consideration of other relevant policies and procedures, including Gypsy Moth Management in the United States, A Cooperative Approach: 1995 Final Environmental Impact Statement (USDA, Forest Service 1995). This comprehensive document analyzed the impacts of the gypsy moth and alternatives for gypsy moth management and serves as a guide to the national gypsy moth management program. The Record of Decision (ROD) (signed January 1996) selected Alternative 6 of the FEIS, supporting funding for the three alternatives (i.e., suppression, eradication, and slow the spread) for management of the gypsy moth.

The USDA recommended through the FEIS and the ROD, that an environmental assessment (EA), rather than a more comprehensive Environmental Impact Statement, is adequate for the proposed site-specific project. The NPS concurs with this approach. This Management Plan/Environmental Assessment is tiered off the FEIS and ROD and documents the site-specific evaluation of the gypsy moth situation at CVNP. This type of tiering is provided for under the Council of Environmental Quality regulations for implementing NEPA.

1.6. How the Gypsy Moth Affects the Environment

The gypsy moth (*Lymantria dispar*), a native of Europe, was introduced into North America around 1869 near Boston, Massachusetts. Since that time the moth has become established and has spread throughout the Northeastern United States, into Ohio and Michigan, and further south into Virginia.

Gypsy moth larvae are voracious defoliators. They prefer oaks, but will also consume dozens of other tree and shrub species to varying degrees including such CVNP resources as basswood, boxelder, sweetgum, willow, maple, hickory, beech and dogwood. In Ohio, the larval or caterpillar life stage of the gypsy moth emerges from egg masses in late-April to early May. In order to develop, larvae go through 5-6 molts or stages (instars) shedding skin as they increase in size. First instar larvae do not feed upon hatching. Young larvae make their way up into the tree canopy where they produce silken threads that enable them to disperse on wind currents. Larvae then feed on leaves through much of June, consuming increasingly large amounts of foliage. By late-June, defoliation

damage is most apparent. Fully developed caterpillars then go through a two-week pupation stage. Adult moths begin to emerge in numbers by late-July to early August, at which time brown male moths can be seen flying during the day seeking females. Female moths are white and do not fly but attract male moths by releasing a powerful sex attractant, or pheromone. After mating, each female lays one egg mass containing 100-1,000 eggs. The mass is coated with hairs from her abdomen. These egg masses remain on the trees, rocks or whatever surface they are deposited through the winter unless consumed, removed or killed by various agents.

The impacts on people and the environment caused by gypsy moths are well documented. A broad spectrum of impacts have been identified and summarized in the FEIS document (USDA, Forest Service 1995). As this environmental assessment (EA) is tiered off of that FEIS, only a brief overview of these impacts follows.

Defoliation directly affects trees by decreasing their health and vigor. This can result in an increased susceptibility to disease and parasites, leading to increased tree mortality. Defoliation and the loss of mature trees can change forest and understory composition, water quality in streams and lakes, and food and habitat quality and availability for both terrestrial and aquatic wildlife. This can result in changes in the abundance and distribution of wildlife. Since the gypsy moth is a non-native species, its known and unknown effects on the environment are not part of natural ecological processes and are therefore largely undesirable.

Gypsy moths also present aesthetic, safety, and health concerns to employees and the public. Large stands of defoliated or dead trees can impact scenic values and present hazardous tree conditions along roadsides. Large numbers of caterpillars and their frass (droppings) can be a nuisance, affecting outdoor recreational experiences. Forest fire hazard levels can be increased with defoliation and tree mortality. Dead trees themselves are safety hazards for park visitors. Some individuals that are exposed to the hairs on gypsy moth larvae may develop skin rashes or irritations and allergies.

1.7. Gypsy Moth Monitoring and Management in CVNP

The CVNP gypsy moth monitoring program began in 1987 with the placement of pheromone traps at over 200 sites using a 1/2-mile grid across the park. These traps contain a pheromone strip to attract flying male moths and a small insecticide strip. From 1987 through 1992, the average number of male moths caught in each trap increased from 0.44 to 33. In 1993 the number increased to 187 and by 1998 it had reached 1422. Traps are useful tools for monitoring low level moth populations and detecting new populations in uninfested areas. They are not used for population reduction. Their use was discontinued after the summer of 1998, as the number of moths trapped became uniformly high and less useful for monitoring.

In 1990, CVNP sponsored a workshop to discuss the expected gypsy moth problem. Participants included NPS staff from other parks already impacted by the moths, other agency representatives and community representatives. At that time, park managers determined that the park would not pursue active gypsy moth management. There were

hopes that the fungus *Entomophaga maimaiga* (Em), which infects and kills gypsy moth larva, might control the moth population as has apparently occurred in the eastern US in recent years. The fungus is known to be present in and around CVNP.

Since 1996, the Forest Service has conducted aerial surveys of the park to quantify gypsy moth defoliation. Within the boundaries of the park, moderate to heavy defoliation was detected that covered approximately 39 acres in 1996, 54 acres in 1997, 175 acres in 1998 and 4372 acres in 1999. The portion of defoliation that occurred on land under federal jurisdiction totaled 168 acres in 1998 and 2153 acres in 1999.

Unfortunately, natural controls failed to suppress gypsy moth populations in 1999. In response to the serious defoliation that occurred that year, 575 egg mass survey plots were conducted in Fall 1999 to assess the current status of gypsy moth populations in all susceptible forests on federal land within the park. The assessment and management of non-federal forests is the responsibility of the Ohio Department of Agriculture (ODA).

The Fall 1999 egg mass surveys indicated that much of the park was at risk for severe defoliation impacts in Spring 2000 (USDI-NPS, 2000a). Egg mass density ranged from 0 to 12,894 per acre across 47 survey blocks (USDI-NPS, 2000a). Most areas (10,992 acres) exceeded the egg mass density threshold associated with defoliation commonly used for residential nuisance control (250 egg masses/acre). Approximately 10,420 acres exceeded 1000 egg masses/acre. Defoliation levels of 40% were predicted at this level of infestation if suppression was not implemented. Predicted defoliation increases rapidly as egg mass densities increase above 1000/acre, with levels approaching 100% defoliation at egg mass densities of 3000/acre (Liebhold *et. al* 1993). Approximately 6560 acres exceeded this threshold.

While egg mass density is a primary indicator of expected defoliation levels, other factors such as past defoliation history and egg mass size can be used to predict potential tree mortality, a serious long-term consequence of defoliation. Using a model developed with the USDA Forest Service, tree mortality risk was predicted across the park. Much of the park was expected to experience moderate (8100 acres) to high tree mortality (2000 acres) from the added stress of another year of defoliation in light of recent drought conditions (USDI-NPS, 2000a). While high defoliation risk covered large areas of the park, expected mortality risks were considered highest primarily in those areas that may suffer repeated defoliation events.

In accordance with the National Environmental Policy Act of 1969, as amended (NEPA), the NPS completed a Draft Environmental Assessment that analyzed the potential environmental consequences of a CVNP gypsy moth suppression program in Spring 2000. This document analyzed 3 alternatives for management of gypsy moth populations: No Action, Suppression in Critical Areas (the Preferred Alternative), and Suppression in All Areas at Risk for Defoliation. Critical areas were defined as forested areas that were at high risk for tree mortality due to past defoliation, areas of significant recreational value, and a 200-foot buffer zone adjacent to non-federal areas designated for suppression by the ODA.

After a 30-day public review period, the NPS issued the Final Environmental Assessment and a Finding of No Significant Impact on April 6, 2000 selecting the Preferred Alternative which prescribed gypsy moth suppression in critical areas of the park using aerial applications of biological insecticides (USDI-NPS, 2000b). In May 2000, approximately 6300 acres of forested federal land were treated with two applications of *Bacillus thuringiensis* variety *kurstaki* (*B.t.k.*) and 800 acres were treated with two applications of Gypchek®. Specifics on these two pesticides are discussed in Section 3.1.1.

After the pesticide treatments, aerial surveys conducted by the Forest Service in July 2000 recorded approximately 404 acres of defoliation inside CVNP (259 acres on federal land). Most of the defoliation occurred in untreated areas. There were 71 acres of defoliation in treatment areas (only 16 acres on treated federal land). There was no defoliation in areas treated with Gypchek®. Suppression was effective in 99.8% of treatment areas on federal land. It is believed that natural controls such as *Em* contributed to gypsy moth control efforts.

Gypsy moth egg mass surveys are being conducted in Fall 2000 to help gauge the status of gypsy moth populations across the park. Results of the survey will help managers assess the effectiveness of the suppression program and identify defoliation risks for 2001.

2. PUBLIC INVOLVEMENT

2.1. Scoping

In reviewing the gypsy moth issue at CVNP, park managers have interacted with other state and federal agencies including the USFS, ODA, other land management agencies, local communities and local residents. The park has also participated in a Gypsy Moth Task Force formed in the summer of 1999 that is made up of representatives of many of these groups. A summary of scoping activities and meetings for 1999-2000 are provided in Appendix 1.

The principal issues of concern for the public identified in our public scoping activities and the FEIS include:

1. How the presence of gypsy moth affects people and the environment;
2. What gypsy moth management options are available; and
3. How gypsy moth management options affect people and the environment.

These and other issues are specifically addressed in this environmental analysis.

2.2. Public Review and Comment of the Draft Plan/EA

On November 17, 2000 the Plan/EA was released for public review. A park representative presented information regarding the availability of the draft Plan/EA to the Gypsy Moth Task Force of a local communities council earlier that week (November 11, 2000). Notices of Availability appeared in the two major local newspapers (The Plain Dealer and the Akron Beacon Journal) and approximately 200 press releases were mailed to local media a week earlier resulting in several additional newspaper notices. The document was made available at park headquarters, on the park's WWW site (www.nps.gov/cuva), and hard copies of the document were made available upon request. The review period for the Plan/EA lasted for 30 days.

One written comment was received which supported suppression of the gypsy moth populations. No preference for either Alternative was indicated. No substantial new information requiring modification of the Plan/EA was contained in this letter, which may be found in Appendix 6.

3. ALTERNATIVES CONSIDERED

3.1. Process Used To Formulate Alternatives

3.1.1. Management Options

The NPS manages pest species using an Integrated Pest Management (IMP) approach. IPM reduces the negative effects of pests while minimizing the impacts of pest management strategies on people and the environment. The FEIS specifies management options available to agencies interested in managing the gypsy moth under several situations, including monitoring and detection, eradication, 'slow the spread' and suppression, depending upon the occurrence and stage of gypsy moth infestation.

Eradication is targeted primarily toward new, isolated infestations and 'slow the spread' is aimed at reducing the expansion of the gypsy moth from infested to non-infested areas. The eastern portion of the state of Ohio is within the established zone for gypsy moth suppression. Treatments prescribed for suppression include the use of two biological insecticides, the bacteria *Bacillus thuringiensis* variety *kurstaki* (*B.t.k.*) and the gypsy moth nucleopolyhedrosis virus (Gypchek®), and one synthetic chemical insecticide, diflubenzuron (Dimilin®).

Gypchek® is the only available insecticide that is target specific to the gypsy moth. When gypsy moth larvae ingest the product containing the virus, it invades the gut wall and attacks the tissues, causing death. Gypchek® has been used extensively and has not been found to affect any other species except for the gypsy moth, in both laboratory and field tests. If adequate supplies were available, this would be the best insecticide to use to avoid non-target impacts. Gypchek® is not known to have any adverse human health risks.

B.t.k. is less specific and will affect other lepidopteran (butterfly and moth) larvae that are feeding during the treatment period. It is not known to have significant direct effects on any other orders of animals or plants. These bacteria contain a crystalline structure that when eaten acts as a stomach poison to the larvae of many species of butterfly or moth that feed on treated leaf tissue and get a lethal dose. While its non-target effects are potentially substantial, the pesticide remains active for only about one week after application. Only lepidopterans that are feeding during this active period may suffer mortality. The impact is also lessened somewhat when applied in a patchwork fashion to highly infested areas. This allows non-target lepidopterans in adjacent non-treated forests to migrate into treated areas throughout the remainder of the season. However, studies on its possible effects continue. After many years of research and use, there is no evidence that the application of *B.t.k.* causes adverse effects on people in treated areas.

Diflubenzuron is the least specific and potentially most detrimental pesticide of the three recommended by the Forest Service. It is not being considered for use in CVNP for reasons outlined in Section 3.2.1.

Gypchek® is preferred over *B.t.k.* as a treatment option primarily due to its host specificity. However, Gypchek® is available only in limited amounts because of a specialized development process that uses live gypsy moth larvae. These supplies are developed and distributed by the Forest Service, and no commercial source is yet available. The Forest Service has set a clear priority for the use of Gypchek® in the protection of federally endangered and threatened species and other sensitive areas. No federally listed species are known to inhabit the park. Enough Gypchek® to treat approximately 800 acres was made available to the park in 1999, but future availability remains uncertain.

The second treatment choice, *B.t.k.*, would be used on any remaining area. The impacts of the action alternatives will be assessed for both Gypchek® and *B.t.k.* in this document.

3.1.2. Management Areas

A land cover classification for CVNP (Mosure-Fok et. al 1975) was reviewed to identify forests on federal land that are susceptible to gypsy moth defoliation. Maps were digitized and imported into a Geographic Information System (GIS) for analysis. To adjust for gross landscape-level changes that may have occurred since the development of this classification, a visual review of color aerial photos from 1991 and digital orthophotoquads from 1994 was conducted. Obvious areas of significant successional change (e.g., from old field/scrub into young forest) or development (e.g., forests into agriculture) were reclassified.

Forest cover types of oak-hickory, maple-oak, oak-beech-maple, hemlock-beech, pine-spruce, maple-sycamore, and the new young forest areas were identified as being moderately to highly susceptible to gypsy moth defoliation based on gypsy moth host preferences (USDA, Forest Service 1995). This data layer was then generalized to eliminate small (< 5 acres) or isolated forest fragments and bottomland riparian areas that are clearly less susceptible. After these modifications, total susceptible forest on federal

land is approximately 11,500 acres (Appendix 2). Any gypsy moth suppression would generally be focused on these forests.

3.2. Alternatives Eliminated From Detailed Study

3.2.1. Use of Diflubenzuron (Dimilin®)

Diflubenzuron, a chitin inhibitor, affects all arthropods including aquatic species. It is the least species-specific pesticide of the three recommended by the Forest Service for suppression and is therefore most likely to have the greatest effects on non-target species. It is an insect growth regulator that kills by interfering with the normal development process (molting) of insects and some other related organisms (e.g., crustaceans). It can persist for a long period of time on leaf surfaces, beyond the time of gypsy moth activity. In the autumn, falling leaves can subsequently affect arthropod leaf litter communities, streams and wetlands. No human health risks are likely from exposure as used in gypsy moth projects. However at very high exposures, some very rare potential human health risks could include changes in blood hemoglobin and carcinogenic effects. For these reasons, diflubenzuron was not considered for use in this park.

3.2.2. Other Gypsy Moth Management Strategies

Management strategies considered inappropriate or ineffective for gypsy moth suppression in the FEIS were not considered for use. These include introducing natural controls (e.g., fungal pathogens, parasitoids, and predators), removing and destroying egg masses, tree trunk bands, silvicultural techniques (selective removal of susceptible trees) and using insecticides other than Gypchek®, diflubenzuron, and *B.t.k.* Other strategies such as mass trapping, mating disruption, and sterile insect techniques were also not considered because these methods are effective only at very low egg mass densities (<10 egg masses/acre) and are recommended only for ‘slow the spread’ situations.

3.2.3. Suppression in Forests Previously Defoliated Only

The option of spraying only forests facing a high risk of mortality due to another year of defoliation would help to address the project objectives of protecting scenic values and the forest ecosystem. However, this option alone would not address the project objectives of protecting recreational values, providing for visitor safety across the park, and cooperating with other landowners and agencies to suppress the gypsy moth. This option will be considered together with others in an integrated plan that addresses all project objectives.

3.2.4. Suppression in Recreational Zones Only

The option of spraying only significant recreational areas would address the project objective of protecting many of the recreational and scenic values and visitor safety concerns. However, this option alone would not address the project objectives of protecting ecological values and cooperating with other landowners and agencies to suppress the effects of the gypsy moth. This option will be considered together with others in an integrated plan that addresses all project objectives.

3.2.5. *Suppression in Buffer Zones Only*

The option of spraying only buffer areas adjacent to non-federal land undergoing treatment would address the project objective of cooperating with other landowners and agencies to suppress the effects of the gypsy moth. However, this option alone would not address the project objectives of protecting recreational, scenic and ecological values and providing for visitor safety across the park. This option will be considered together with others in an integrated plan that addresses all project objectives.

3.3. Alternatives

3.3.1. *Alternative 1: No Action*

The no action alternative in this document means that CVNP would take no action to suppress or control the gypsy moth on federal land within the park. The gypsy moth populations and any associated impacts would continue to fluctuate in response to food availability, weather, natural control agents, and suppression activities performed by other agencies and private landowners on adjacent lands.

3.3.2. *Alternative 2: Suppression in Critical Areas*

This is the preferred alternative. The need for suppression of gypsy moth populations would be determined annually by park managers as outlined in *Appendix 3. Identifying Critical Areas for Gypsy Moth Suppression - Cuyahoga Valley National Park, Ohio*. See this Appendix for a full description of this alternative.

Briefly, any prescribed treatments would be focused primarily on a set of Gypsy Moth Management Areas. These management areas were selected because their protection would best achieve all program objectives as stated in Section 1.4. These areas include forested areas that have been previously defoliated, areas of significant recreational value, and buffer zones adjacent to non-federal treatment areas. Other susceptible areas would not be targeted for treatments.

The decision regarding which if any of these areas would be treated each year would be based on a set of criteria including defoliation risk, tree mortality risk, the history of previous treatments, and the presence of sensitive areas. Critical protection goals would be met while attempting to minimize pesticide applications each year. The total area treated will fluctuate annually responding to changes in gypsy moth population levels and defoliation effects as documented by an annual monitoring program.

Pesticide applications of *B.t.k.* or Gypchek® would be used in all treatments. Low-flying aircraft (fixed wing or helicopters) would apply these pesticides just after the emergence of gypsy moth caterpillars in early May. The park would continue coordination efforts with other agencies and notify the public of any treatment plans each year.

3.3.3. *Alternative 3: Suppression in All Areas at Risk for Defoliation*

Any forests susceptible to gypsy moth defoliation would be treated whenever egg mass survey results indicate a risk of defoliation (i.e., areas having a minimum of 250 egg masses/acre). This alternative differs from Alternative 2 in that current defoliation risk

alone would determine whether an area is treated. Generally, this alternative would often result in a larger prescribed treatment area than Alternative 2 and is more likely to involve repeated treatments of an area in consecutive years. A maximum of approximately 11,500 acres of forested federal land would be designated for treatment each year. Treatment areas would be sprayed as described in Alternative 2.

4. IMPACTS OF THE ALTERNATIVES

4.1. Methodology

A number of ecological, cultural, social, and economic factors were considered in assessing the potential environmental impacts of the alternatives being considered. A large amount of information on impacts were compiled and analyzed in respect to gypsy moth treatment alternatives in the FEIS. This information was supplemented with additional scientific literature and consultation with other agencies and scientists. The analysis of impacts in this section is tiered off of the FEIS and is appropriately brief and focused on critical site-specific issues. Additional detail on the effects of the Alternatives on the environment is available in the FEIS.

4.2. Summary of Environmental Impacts of Alternatives

The results of these evaluations are summarized in Table 1 below. If no impact is expected, this is indicated with an 'N' (No). If an impact is anticipated for a factor, this is indicated with a "Y" (Yes). If a beneficial or positive impact is expected, this is indicated with a plus sign (+). If a negative impact is expected, this is indicated with a minus sign (-). Note that an alternative may have both positive and negative impacts. Environmental factors that are likely to be affected by one or more of the alternatives are reviewed in the next section.

Table 1. Summary of Environmental Impacts of Alternatives

ENVIRONMENTAL CONSIDERATIONS	ALTERNATIVES		
	1	2	3
<u>Biological Environment</u>			
Gypsy moth	Y±	Y±	Y±
Non-target Lepidoptera (butterflies and moths)	Y±	Y±	Y±
Other wildlife	Y±	Y±	Y±
Vegetation	Y±	Y±	Y±
Federally listed endangered or threatened species	N	N	N
State listed endangered or threatened species	Y±	Y±	Y±
Critical habitats (for federally listed species)	N	N	N

ENVIRONMENTAL CONSIDERATIONS**ALTERNATIVES****1 2 3****Physical Environment**

Cultural landscape	Y-	Y-	N
Properties listed on the National Register of Historic Places	Y-	Y-	N
Properties eligible for listing on the National Register of Historic Places	Y-	Y-	N
Property listed on the National Registry of Natural Landmarks	N	N	N
Property listed as a National Historic Landmark	N	N	N
Property listed on the World Heritage list	N	N	N
Known archaeological sites	Y-	Y-	N
Conversion of prime farmland	N	N	N
Scenic values	Y-	Y+	Y+
Private Land	Y-	Y+	Y+
Coastal zone	N	N	N
Floodplains	N	N	N
Wetlands	Y-	Y-	N
Air Quality	N	N	N
Water Quality	Y-	Y-	N

Social Environment

Visitor use patterns	Y-	Y \pm	Y \pm
Visitor travel patterns	Y-	Y \pm	Y \pm
Travel patterns of transients (i.e., passers-by, commuters)	N	N	N
Recreational opportunities	Y-	Y \pm	Y \pm
Local communities	Y-	Y \pm	Y \pm
Visitor and employee safety	Y-	Y+	Y+
Safety of transients	Y-	Y-	N
Visitor and employee health	Y-	Y \pm	Y \pm
Health of transients	Y-	Y-	N

Economic Environment

Regional employment trends	N	N	N
Local employment trends	Y+	N	N
Visitor expenditures	Y-	Y \pm	Y \pm
Local economies	Y-	Y \pm	Y \pm

4.3. Impacts of the Alternatives

4.3.1. Impacts of Alternatives on the Biological Environment

4.3.1.1. Gypsy Moth

Affected Environment

The current status of the gypsy moth population is discussed in Section 1.7. The gypsy moth is the target for the proposed action.

Direct and Indirect Effects

Alternative 1 would allow gypsy moth populations to fluctuate unimpeded in response to environmental conditions, host availability, predation, and natural control organisms. Fluctuations may include future outbreaks or population crashes. In Alternative 2, significant mortality (60-90%) to young gypsy moth caterpillars is expected in treated areas. A reduction in gypsy moth populations is expected for 1-2 years following treatment, although some small areas of high population density may remain. Caterpillars outside treated areas would be expected to fluctuate as in Alternative 1. The impacts of Alternative 3 are the same as Alternative 2, but may affect caterpillars throughout a larger area.

Cumulative Impacts

In Alternative 1, the reduced availability of preferred host tree species may occur if outbreaks cause significant tree mortality. This may cause gypsy moth population declines. In Alternative 2, the future effectiveness of natural control by the fungus *Entomophaga maimaiga* (*Em*) and the nucleopolyhedrosis virus (NPV) may be diminished in treatment areas because these natural controls are most effective at high population densities. This may benefit gypsy moth populations. However, as expected mortality levels will not be 100% and many pockets of gypsy moth populations will remain untreated, these natural controls are expected to remain in place throughout the ecosystem. Treatments in consecutive years would be minimized under this alternative reducing the possibility of long-term effects on natural controls. Under Alternative 3, the effectiveness and presence of natural controls could be reduced even more than in Alternative 2 since fewer pockets of gypsy moth populations would remain untreated and treatments in consecutive years would be more likely. However, gypsy moth populations may be kept at lower densities from year to year under this alternative.

4.3.1.2. Non-target Lepidoptera (Butterflies and Moths)

Affected Environment

Some limited information on the lepidopteran fauna of CVNP is available. Records for the two counties that encompass CVNP indicate that at least 86 species of butterflies and skippers are known from Cuyahoga County and 65 species are known Summit County (Iftner *et al.* 1992). Butterfly monitoring projects have generated 5 years of data on the Lepidoptera species found in CVNP from two monitoring areas (one in each county of the park) (USDI, National Park Service 2000c). Sixty-one butterfly species have been documented thus far but there are probably additional species of butterflies, skippers, moths and microlepidoptera that remain undocumented.

A current list of butterfly and skipper species and their habitats is found in Appendix 4. More than 20 of these species are closely associated with forest habitats and margins and some are specifically associated with oak dominated areas including the Banded Hairstreak (*Satyrium calanus falacer*), Edwards' Hairstreak (*Satyrium edwardsii*), Juvenal's Duskywing (*Erynnis juvenalis*), Horace's Duskywing (*Erynnis horatius*), Sleepy Duskywing (*Erynnis brizo*), and the Northern Cloudywing (*Thorybes pylades*).

Direct and Indirect Effects

The impact of the gypsy moth and gypsy moth treatments on native Lepidoptera will largely be dependent upon the species and developmental stages of caterpillars in the treatment areas. Characteristics such as larval stages and activity, number of broods per year, host plant preferences, habitat associations and other factors may determine susceptibility. It is expected that spring-feeding lepidopterans and species more closely associated with forested areas are most likely to be directly affected, but other species may also be affected indirectly. For example, changes in the understory vegetation as a result of defoliation may subsequently affect host plant availability.

In Alternative 1, native Lepidoptera dependent upon forests and forest margin habitats, especially oak-dominant forests, may be negatively affected by additional defoliation events and the resulting tree mortality. Other species may benefit by the presence of gypsy moths and their effects on the habitat due to changes in understory host plant communities. In Alternative 2, some non-target Lepidoptera populations that are actively feeding during and 8-10 days after treatment are expected to suffer mortality in areas treated with *B.t.k.*, resulting in temporary population declines. The level of mortality experienced will vary from species to species. No such treatment effects are expected in areas treated with Gypchek®. Other lepidopteran species may benefit from preventing the effects of defoliation on the understory. The impacts of Alternative 3 are the same as Alternative 2, but may affect Lepidoptera throughout a larger area.

Cumulative Impacts

In Alternative 1, forest-dependent Lepidoptera may be negatively affected by future defoliation events and the resulting tree mortality and changes in forest composition. Lepidoptera associated with open woods not dominated by oaks may benefit from these impacts. Other species may benefit from changes in the understory brought about by defoliation and tree mortality. Under Alternative 2 and 3, affected native Lepidoptera populations may remain low for several years but are expected to recover to pre-treatment levels within 1-2 years of *B.t.k.* treatment through recolonization and reproduction. Recovery time for each species may be dependent upon the number of broods per year (i.e., species with multiple broods may recover more quickly) and dispersal abilities. Treatments in consecutive years would be minimized under this alternative, allowing for recovery. Recovery may be slower under Alternative 3 as it may cover a larger area thereby reducing the opportunity for dispersal from untreated adjacent areas. Alternative 3 is also more likely to involve repeated *B.t.k.* treatments for an area in consecutive years, further reducing recovery opportunities.

4.3.1.3. Vegetation

Affected Environment

CVNP contains more than 19,000 acres of forest, most of which is susceptible to gypsy moth defoliation, including oak-hickory, maple-oak, oak-beech-maple, hemlock-beech, pine-spruce, and maple-sycamore forest types. Oak-type forests, the most highly preferred host type for gypsy moths comprise approximately 80% of forest cover. Approximately 11,500 acres of forests susceptible to gypsy moths are under federal jurisdiction. Important riparian zones exist along the river and streams. Other major park habitats include old field/scrub, agricultural fields, wetlands, and suburban lands. Approximately 900 plant species occur in the park.

Direct and Indirect Effects

In Alternative 1, defoliation is expected to occur throughout much of the park, especially in oak-dominated areas. Deterioration of tree health is expected in defoliated areas, which leads to increased tree mortality. Some trees may die after one year of defoliation stress, but tree mortality is expected to be higher in areas suffering from repeated defoliation events. Defoliation allows sunlight to penetrate to the forest floor, benefiting some shade-intolerant species while adversely affecting other plants that require shade. Changes in humidity levels on the forest floor may affect plant growth. Changes in the forest understory composition would be expected.

In Alternative 2, treatment areas would largely be protected from gypsy moth defoliation and its impacts. A temporary reduction in lepidopteran pollinators in areas treated with *B.t.k.* may occur. Impacts similar to Alternative 1 are expected in untreated areas. In Alternative 3, effects similar to Alternative 2 are expected but is more likely to occur over a larger area.

Cumulative Impacts

In Alternative 1, repeated outbreaks of gypsy moth may lead to the loss of oak species and other trees and could permanently change the composition of the forest and its understory vegetation. Loss of oaks may make the forests less susceptible to gypsy moth in the future. Species adapted to openings in the forest are expected to thrive while shade-intolerant species may decrease in abundance. Alternative 2 may protect treated areas from the impacts of defoliation for several years. Lepidopteran caterpillars are expected to recover to pre-treatment levels within 1-2 years in areas treated with *B.t.k.* Alternative 3 may also protect treatment areas from the effects of defoliation. The recovery of lepidopteran pollinators may be slower under Alternative 3 as it may cover a larger area thereby reducing the opportunity for dispersal from untreated adjacent areas. Alternative 3 is also more likely to involve repeated *B.t.k.* treatments for an area in consecutive years, further reducing recovery opportunities.

4.3.1.4. Wildlife

Affected Environment

The forests, fields, wetlands, streams, and ponds in CVNP harbor a broad diversity of wildlife, including 32 species of mammals, approximately 200 species of birds, 22 amphibians, 18 reptiles, and 28 fish species. Some notable species include coyote (*Canis latrans*), white-tailed deer (*Odocoileus virginianus*), beaver (*Castor canadensis*), and great-blue herons (*Ardea herodias*). The invertebrate taxa are generally not well inventoried. However, aquatic macroinvertebrate species are known to number in the hundreds. Additionally, hundreds of insects, arachnids, crustaceans and other invertebrate species are likely to inhabit CVNP.

Direct and Indirect Effects

In Alternative 1, the expected gypsy moth defoliation may affect the abundance and distribution of wildlife due to changes in vegetation and habitat structure. Some species may respond favorably while others are negatively impacted. For example, defoliation causes a loss of cover for nesting bird species, increasing predation risk and eliminating suitable nesting sites. A reduction in the abundance of other leaf-feeding insects can be expected as well, reducing food availability for some songbirds. However, some wildlife species may thrive in response to the abundant gypsy moth caterpillar as a food source itself (e.g., cuckoos). Most birds do not feed on the gypsy moth caterpillar. White-tailed deer may migrate to avoid defoliated areas. Decreased acorn production in oaks stressed by defoliation can reduce food availability and may cause declines in some acorn-dependent wildlife populations. Defoliation can increase water temperatures in small streams and can cause declines in fish and aquatic invertebrate populations.

In Alternatives 2 and 3, the impacts to wildlife resulting from defoliation would largely be prevented in treated areas. *B.t.k.* is not known to have significant direct effects on any

other wildlife, except feeding Lepidoptera as discussed in Section 4.3.1.2. Gypchek affects only the gypsy moth. Birds and mammals may temporarily switch their diet due to a reduction of Lepidoptera in treated areas. It is possible that some gypsy moth parasitoids (e.g., parasitic wasps) may be negatively or positively indirectly affected by a reduction in their host.

Cumulative Impacts

In Alternative 1, tree mortality due to defoliation stress may cause reductions or elimination of squirrel and tree nesting bird populations but may also provide additional habitat (in the form of dead trees) for other wildlife. Acorn production may be reduced for several years after the actual defoliation events. Increased understory growth due to forest openings may provide additional habitat and food sources for some wildlife. Both Alternatives 2 and 3 may protect treated areas from the impacts of defoliation on wildlife for several years. Lepidopteran caterpillars are expected to recover to pre-treatment levels within 1-2 years in areas treated with *B.t.k.* The recovery of Lepidoptera may be slower in Alternative 3 because *B.t.k.* treatments may cover larger areas and repeated treatments for an area in consecutive years are more likely.

4.3.1.5. Endangered and threatened species

Affected Environment

No federally listed endangered or threatened plant or animal species are known to occur in CVNP. The federally threatened bald eagle (*Haliaeetus leucocephalus*) has been reported to occasionally move through the park, but is not known to nest in the area. CVNP has habitat suitable for the federally endangered Indiana bat (*Myotis sodalis*), but there are no verifiable records for the species in the park. The US Fish and Wildlife Service (USFWS) has been consulted in accordance with the Endangered Species Act and has determined that the action alternatives would have no effect on these or other listed species that may occur in the park (Appendix 5). Responses to several USFWS comments on the EA are included in this Appendix. Some state-listed endangered, threatened or potentially threatened bird and plant species have been recorded in CVNP including 20 birds and 20 plants.

Most of the state-listed birds recorded in the park are known only as transient migrants or accidental occurrences. Only 3 species are recorded as having nested in the park including the Dark-eyed Junco (*Junco hyemalis*), Winter Wren (*Troglodytes troglodytes*), and Hermit Thrush (*Catharus guttatus*). At least ten of the state listed bird species are more closely associated with forested habitats, including:

<u>Common Name</u>	<u>Scientific Name</u>
Canada Warbler	<i>Wilsonia canadensis</i>
Dark-eyed Junco	<i>Junco hyemalis</i>
Golden-winged Warbler	<i>Vermivora chrysoptera</i>
Hermit Thrush	<i>Catharus guttatus</i>
Loggerhead Shrike	<i>Lanius ludovicianus</i>
Magnolia Warbler	<i>Dendroica magnolia</i>
Northern Waterthrush	<i>Seiurus noveboracensis</i>
Sedge Wren	<i>Cistothorus platensis</i>
Winter Wren	<i>Troglodytes troglodytes</i>
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>

Twenty currently state-listed endangered, threatened or potentially threatened plants have been recorded in the park. Of these species, eleven are found at least occasionally in and near forested habitats, including: *Carex arctata*, *Carex argyrantha*, *Carex radiata*, *Corallorrhiza maculata*, *Corydalis sempervirens*, *Cypripedium calceolus* var. *pubesens*, *Juglans cinerea*, *Lechea intermedia*, *Poa languida*, *Solidago squarrosa* and *Spenopholis pensylvanica*. The only listed tree species (*J. cinerea*) is reported to be generally resistant but not immune to gypsy moth defoliation (USDA Forest Service, 1995). Only a few of the state-listed plants are thought to be pollinated by Lepidoptera. *Sheperdia canadensis* and *L. intermedia* are possibly pollinated by small lepidopterans along with other insects (W. Stoutamire, pers. comm. 2000).

Direct and Indirect Effects

Alternative 1 may affect state-listed bird species as described for all birds in Section 4.3.1.4. Those more closely associated with forested habitats and adjacent open areas and that nest in the park are probably more sensitive to these changes. Species associated with closed canopy forests may be negatively affected, while others may thrive in response to changes and openings in the forest caused by gypsy moth outbreaks. Alternative 2 would largely protect state-listed species from the consequences of defoliation in treated areas. This alternative may cause some of the state-listed birds, especially nesting species to temporarily switch diets in response to a reduced abundance of caterpillars, but adjacent untreated areas would remain unaffected. This impact is reduced in areas treated with Gypchek®. Alternative 3 would have similar effects to Alternative 2, except that caterpillar abundance would probably be reduced across a larger area of the park.

In Alternative 1, state-listed rare plants that are dependent upon closed-canopy forests may be negatively affected by additional defoliation events. For example, *C. arctata* prefers shaded habitats and may not respond favorably to defoliation. However, other species may benefit from the additional sunlight that reaches the forest floor. Individual *J. cinerea* trees could possibly be impacted during large moth outbreaks. In Alternative 2, state-listed rare plants in forests would largely be protected from the impacts of defoliation in treated areas. A temporary reduction in lepidopteran pollinators may affect the reproduction of a few state-listed species in areas treated with *B.t.k.* This impact may

be small, as rare plants may not normally reproduce each year and are often adapted to delayed reproduction. This impact would not be expected in areas treated with Gypchek®. Alternative 3 would have the same impacts as Alternative 2, except these may occur over a larger area.

Cumulative Impacts

In Alternative 1, changes in the forest canopy and understory due to repeated defoliation events may change the distribution and abundance of state-listed plants and animals. In Alternative 2 and 3, these species may be protected from these impacts in treated areas for several years. Lepidopteran caterpillars are expected to recover to pre-treatment levels within 1-2 years in areas treated with *B.t.k.* The recovery of Lepidoptera may be slower in Alternative 3 because *B.t.k.* treatments may cover larger areas and repeated treatments for an area in consecutive years are more likely.

4.3.2. Impacts of Alternatives on the Physical Environment

4.3.2.1. Historical, Cultural and Archaeological Resources

Affected Environment

CVNP contains many historical sites and structures that may be associated with landscaping or historically significant plantings that could be susceptible to gypsy moth defoliation. Sixty-four such sites are currently listed on the National Register of Historic Places and carry additional responsibility to preserve the cultural landscape. The most significant in size is the 530 acre Virginia Kendall Historic District is listed as historically significant due to its portrayal of "naturalistic landscape design" in which a pattern of open and wooded spaces was utilized, including historical plantings by the Civilian Conservation Corps in the 1930s. Additionally, more than 200 archaeological sites have been documented in the park. Cultural resource compliance for this project as required under Section 106 of the National Historic Preservation Act, as amended, has been completed. The compliance documents completed for the earlier gypsy moth suppression project of 2000 (USDI-NPS, 2000b) were deemed applicable to this EA by NPS cultural resources staff (Appendix 5). These documents had indicate that the Ohio Historic Preservation Office and NPS cultural resource staff concluded that the preferred alternative will have no significant detrimental effect on cultural resources.

Direct and Indirect Effects

Under Alternative 1, susceptible historical plantings and landscaping trees may be defoliated, increasing the risk of tree mortality. Trees near archaeological resources may be impacted similarly, leading to changes in the environment (e.g., increased erosion potential and sunlight) around these areas leading to possible impacts. The gypsy moth and their droppings may cause some discoloration of historical buildings, especially in highly infested areas. In Alternative 2, cultural resources in areas designated for treatment would largely be protected from the effects of gypsy moths. The cultural landscape in the

Virginia Kendall unit would be included in a Gypsy Moth Management Area, addressing the most significant cultural resource concern. Effects similar to Alternative 1 would be expected in untreated areas, possibly leaving some cultural resources unprotected. Alternative 3 would have the same effect as Alternative 2, but may also protect additional areas.

Cumulative Impacts

For Alternative 1, the loss of historical plantings and landscaping may require the replacement of individual trees, perhaps with different species not as susceptible to gypsy moths. This could lead to undesirable changes in the cultural landscape over time and the unnecessary loss of cultural resources. Some buildings may require cleaning or repainting if repeatedly stained by gypsy moths and their droppings. Areas designated for treatment in Alternatives 2 may be protected from these effects for several years. Alternative 3 would have the same effect as Alternative 2, but may also protect additional areas.

4.3.2.2. Scenic Values

Affected Environment

CVNP is composed of a largely forested landscape bisected by the Cuyahoga River, interspersed with old fields, agriculture, and historic buildings. Visitors and passers-by can enjoy this landscape from the many roads and highways and more than 100 miles of trails that cross the park. The scenic values of the park are increasing as natural areas outside the park face increasing development pressures.

Direct and Indirect Effects

In Alternative 1, gypsy moths will negatively affect the scenic values of the park if defoliation occurs as expected. Large expanses of defoliated forest are unattractive and appear unnatural, as trees should be in full foliage during this time of year. It is possible that other aesthetically pleasing species such as wildflowers may increase in number due to defoliation and thereby enhance scenic value. In Alternative 2, no impacts to scenic values due to gypsy moth defoliation are expected in treated areas as noticeable defoliation is expected to be largely prevented. Defoliation that may occur in untreated forests may affect scenic values in those areas. Alternative 3 may provide the most protection for scenic values because the treatment area would include all areas susceptible to defoliation.

Cumulative Impacts

In Alternative 1, gypsy moths may negatively affect the scenic values of the park through repeated outbreaks. Increased tree mortality in areas experiencing multiple defoliation events will leave a large number of dead trees in some areas, negatively affecting the aesthetics of the forest for a longer period of time. Alternative 2 may protect treated areas

from the impacts of defoliation on scenic values for several years. Alternative 3 would have the same effect as Alternative 2, but may also protect additional areas.

4.3.2.3. Private Land

Affected Environment

A patchwork of ownership exists within the park boundary. Only approximately 18,000 of the 33,000 acres within the CVNP boundary are owned by the federal government. Other lands are owned and managed by metropark systems, scout camps, golf courses, ski areas, and individuals. Outside its boundary, the park is largely surrounded by private land. In response to the 1999 gypsy moth outbreak, many private landowners and communities organized to apply in blocks for egg mass surveys and treatment by the State of Ohio in 2000. Many of these areas satisfied the State's spray program criteria and were treated. It is expected that this pattern of non-federal suppression actions will continue with more areas treated following outbreak years and less during years when defoliation is not prevalent.

Direct and Indirect Effects

In Alternative 1, the gypsy moth outbreaks on federal land may affect neighboring non-federal land, including land that is actually being treated for gypsy moths that year. Mature gypsy moth caterpillars may migrate several hundred feet from where they have depleted their food source into adjacent untreated areas, possibly leading to defoliation and tree mortality despite the suppression activities of the landowner. In Alternative 2, nonfederal land that is designated for treatment would largely be protected from gypsy moth caterpillars dispersing from adjacent federal land as adequate buffer zones to all non-federal lands undergoing treatment would also receive treatment if requested by the ODA. Alternative 3 would have the same effect as Alternative 2, but may also protect some additional non-federal land not designated for treatment under Alternative 2 from the dispersal of gypsy moths.

Cumulative Impacts

In Alternative 1, gypsy moths may become reestablished on non-federal land despite being treated this season because of movement from untreated federal land. This may result in the need to treat these areas again the following year. Alternative 2 may protect non-federal land adjacent to treated areas from dispersing gypsy moth populations for several years. Alternative 3 would have the same effect as Alternative 2, but may also protect some additional non-federal land.

4.3.2.4. Water Quality and Wetlands

Affected Environment

More than 20 miles of the Cuyahoga River passes through CVNP. Numerous streams and tributaries totaling 190 miles exist within the park boundary. More than 70 man-made ponds and lakes dot the landscape. The park staff and other agencies closely monitor water quality. Water quality varies from good to poor across the park, with major concerns for septic and treatment plant discharge and erosion. More than 800 wetlands are found throughout the park and represent an important habitat for many animal and plant species.

Direct and Indirect Effects

In Alternative 1, gypsy moths may affect the water quality of the park rivers and streams if defoliation occurs as expected. The results of defoliation can include temporary changes in water temperature, dissolved oxygen levels, pH, nutrient concentration, sediment load, stream discharge and flow rate, and other variables. Affected streams may pass these impacts to the wetlands in which they may drain. In Alternative 2, the impacts of defoliation on water quality and wetlands may be largely prevented in treated areas. No effects on water quality from pesticide treatments are anticipated. Impacts similar to Alternative 1 may be expected in untreated areas. Alternative 3 would have the same effect as Alternative 2, but may protect additional areas.

Cumulative Impacts

In Alternative 1, the loss of trees due to the stresses of defoliation can increase the impacts on water quality and wetlands. In Alternative 2, the impacts of defoliation on water quality may be largely prevented in treated areas for a number of years. Alternative 3 would have the same effect as Alternative 2, but may protect additional areas.

4.3.3. Impacts of Alternatives on the Social Environment

4.3.3.1. Visitor Use and Recreational Value

Affected Environment

CVNP contains many important recreational facilities, including the Ohio & Erie Canal Towpath Trail, over 100 miles of additional trails, several day use areas, two visitor centers, and an environmental education center. CVNP receives more than 3.5 million visits annually, with the highest visitation occurring during the spring, summer and fall months.

Direct and Indirect Effects

In Alternative 1, gypsy moths are likely to impact the recreational value of the park if an outbreak occurs as expected. Visitor experiences may be negatively affected by forests denuded of foliage, the lack of shade on trails, large amounts of caterpillars and frass (caterpillar droppings), and health and safety concerns. Some potential visitors may respond by avoiding use of the park during the summer while gypsy moths are active. In Alternative 2, the impacts to recreational values and visitor use due to gypsy moth defoliation would be largely prevented. The most significant park trails and facilities likely to be affected by gypsy moth outbreaks would be treated. Some areas of moderate to low use and undeveloped areas may experience impacts to recreational value if outbreaks occur in those areas. Visitor use may be briefly impacted during the treatment period (~10 days) as visitors may avoid being in the park during the application of pesticides. Visitors may experience reduced opportunities for viewing native Lepidoptera in areas treated with *B.t.k.* Alternative 3 would have the same effects as Alternative 2, but may involve additional areas.

Cumulative Impacts

In Alternative 1, repeated gypsy moth outbreaks and safety concerns regarding dead trees and falling limbs may affect recreational values and visitor use over the long-run as visitors learn to avoid troublesome areas. In Alternative 2, impacts to recreational values and visitor use due to gypsy moth defoliation are expected to be largely prevented for several years in treated areas. Viewing opportunities for native Lepidoptera are expected to return to pre-treatment levels within 1-2 years. Alternative 3 would have the same benefits as Alternative 2, but may involve additional areas. The recovery of Lepidoptera may be slower in Alternative 3 because *B.t.k.* treatments may cover larger areas and repeated treatments for an area in consecutive years are more likely.

4.3.3.2. Health and Safety

Affected Environment

In addition to the 3.5 million visitors each year, CVNP employees number approximately 200. Additionally, approximately 1200 park volunteers assist in a variety of programs and projects. Many employees and volunteers spend significant amounts of time outdoors. Many additional people just pass through the park each year as transients.

Direct and Indirect Effects

In Alternative 1, gypsy moths may affect the health and safety of visitors, employees and transients. Skin rashes and other irritations from contact with gypsy moths may occur. Some sensitive individuals may become allergic to the gypsy moth. Increased tree mortality resulting from defoliation stresses may pose a hazard due to falling limbs and trees. Some potential visitors may respond by avoiding use of the park areas containing many dead trees. Defoliated areas are also at an increased risk of fire danger due to solar

drying of leaf litter. Transients (visitors that just pass through the park) could be affected if dead trees fall in the road causing a hazard. In Alternative 2, the impacts to health and safety due to gypsy moth defoliation may be largely prevented. The most significant park trails and facilities likely to be affected by gypsy moth outbreaks would be treated. Some impact to visitor health and safety may occur in untreated areas.

There is no evidence after years of study and use that the application of *B.t.k.* would affect people in treated areas. For *B.t.k.*, minor irritations of the skin, eyes or respiratory tract may occur in people who handle and apply the pesticide. Gypchek has no known adverse effects on people, but some sensitive individuals that are exposed may experience minor irritations similar to that of the gypsy moth. These effects are much more likely to occur in people who handle and apply the pesticide. Alternative 3 would have the same impacts as Alternative 2, but may protect additional areas.

Cumulative Impacts

In Alternative 1, repeated gypsy moth outbreaks and safety concerns regarding dead trees and falling limbs may affect public health and safety over the long run as the number of dead and potentially hazardous trees increase. In Alternative 2, impacts to public health and safety due to gypsy moth defoliation are expected to be largely prevented for several years in treated areas. Alternative 3 would have the same impacts as Alternative 2, but would protect additional areas.

4.3.3.3. Local Communities

Affected Environment

Parts of fifteen townships, villages and cities in two counties are within the park, with the Village of Peninsula being completely surrounded by the park. These neighboring communities include a mix of residential, agricultural and business areas. No minority or economically disadvantaged populations are expected to be inordinately impacted by any of the alternatives.

Direct and Indirect Effects

In Alternative 1, the expected gypsy moth outbreak on federal land may affect neighboring non-federal land, including land that is actually being treated for gypsy moths in a given year. Mature gypsy moth caterpillars may migrate several hundred feet from where they have depleted their food source into adjacent untreated areas, possibly leading to defoliation and tree mortality despite suppression activities. In Alternative 2, non-federal land that is designated for treatment would largely be protected from gypsy moth caterpillars dispersing from adjacent federal land, as adequate buffer zones to non-federal lands undergoing treatment may also receive treatment when requested by ODA. Alternative 3 would have the same effect as Alternative 2, but may also protect some additional non-federal land not designated for treatment this season from the dispersal of gypsy moths.

Cumulative Impacts

In Alternative 1, gypsy moths may become reestablished on non-federal land despite being treated in a season because of movement from untreated federal land. This may result in the need to treat these areas again in subsequent years. Alternative 2 may protect non-federal land from dispersing gypsy moth populations for several years. Alternative 3 would have the same effect as Alternative 2, but may also protect some additional non-federal land from dispersing gypsy moths.

4.3.4. Impacts of Alternatives on the Economic Environment

Affected Environment

See Sections 4.3.3.1 and 4.3.3.3 for descriptions of visitors and local communities. It is likely that the numerous small businesses (e.g., bike shops, restaurants) in and around the park benefit from the expenditures of park visitors. Additionally, tree trimming and removal businesses may be directly affected by gypsy moth outbreaks.

Direct and Indirect Effects

In Alternative 1, future gypsy moths outbreaks may cause potential visitors to avoid the park and neighboring communities while gypsy moths are active due to nuisance, health and safety concerns. This reduced visitation could negatively impact local economies and visitor expenditures. Businesses that specialize in tree trimming and removals may benefit from additional work opportunities in and around the park. This could result in temporary increases in employment and profit. In Alternative 2, these impacts would largely be avoided. Potential visitors may avoid the park and surrounding communities during the treatment period due to concerns over the pesticide use. Work opportunities in tree removal may exist but would be less than in Alternative 1. Alternative 3 has the same impacts as Alternative 2, except that more areas may be protected from gypsy moth impacts and therefore work opportunities in tree removal may be fewer.

Cumulative Impacts

Under Alternative 1, repeated defoliation events may result in increased levels of tree mortality in and around the park, sustaining increases in tree-trimming business opportunities. These sustained opportunities may be reduced under Alternative 2, and would be minimized under Alternative 3.

4.4. Recommendation

Based upon the analysis documented in this environmental analysis and the FEIS it is our recommendation that Alternative 2 be implemented. Suppression would be focused primarily on a set of Gypsy Moth Management Areas which include forested areas that have been previously defoliated, areas of significant recreational value, and buffer zones

adjacent to non-federal treatment areas. Other areas would not be selected for treatments. The decision regarding which if any of these areas would be treated each year would be based on a set of criteria including defoliation risk, tree mortality risk, the history of previous treatments, and the presence of sensitive areas. The total area treated will fluctuate annually responding to changes in gypsy moth population levels and defoliation effects as documented by an annual monitoring program. The park would continue coordination efforts with other agencies and notify the public of any treatment plans each year.

While positive and negative impacts can be identified for all of the alternatives, Alternative 1 has the greatest potential for both short-term and long-term negative impacts to people and the environment. If pesticides are not applied, severe defoliation to the forested areas of the park is expected, possibly resulting in significant tree mortality especially in areas previously defoliated. Impacts to scenic, recreational and ecological values, and public health and safety are expected. Furthermore, adjacent non-federal lands would not be protected from dispersing gypsy moths, even if those areas are treated. Suppression activities as outlined in Alternative 2 and 3 would help address the impacts expected under Alternative 1. However, Alternative 3, which would usually require spraying a larger area may have additional undesirable negative effects on non-target species such as native Lepidoptera and on the natural controls of the gypsy moth.

Alternative 2 best addresses the project objectives of minimizing the short and long-term effects of gypsy moth outbreaks on the scenic, recreation and ecological values of the park while supporting suppression activities on adjacent non-federal land. Critical areas are designated for treatment while other areas remain untreated. This approach will help to mitigate and minimize any impacts that this alternative may have on non-target organisms and the natural controls of the gypsy moth. Any temporary effects that treatment may have are outweighed by the potential long-term impacts of Alternative 1. This alternative is compatible with the selected alternative in the FEIS and ROD, in that these biological insecticide applications are the only operational IPM component that will meet the objectives identified in this EA. Ongoing monitoring results will be used to identify any areas in need of treatment in the future.

In carrying out this action, the NPS is bound by the provisions of the National Environmental Policy Act of 1969 (NEPA) which requires environmental analysis of proposed major federal actions that may significantly effect the quality of the human environment. NEPA and NPS policies require assessment of alternative management actions to facilitate balanced, integrated approaches to resource protection and development. These requirements have been met by the FEIS and ROD and the development of this site-specific Management Plan/EA. The selected alternative involves the use of insecticides that are registered for suppression of the gypsy moth, and which will be applied according to label requirements. This meets the provisions of the Federal Insecticide, Fungicide, and Rodenticide Act of 1947 as amended.

Our recommendation to implement Alternative 2 is based upon compliance with, and the authority granted by the federal laws and regulations previously described and with NPS

policies. This project conforms to the USFS policy to protect and preserve the forest resources of the nation against destructive forest insects and disease. This recommendation was guided and is supported by the following factors:

1. The insecticides proposed for use are registered for that intended purpose by the Environmental Protection Agency;
2. Insecticide applications proposed in CVNP comply with EPA label directions, city and federal laws, and NPS regulations;
3. The insecticides chosen affect only gypsy moths and other Lepidoptera present in treatment areas at the time of spraying;
4. The potential effects of treatment on non-target Lepidoptera populations are considered temporary and partially mitigated by leaving many areas untreated and minimizing repeated treatments in consecutive years;
5. No federally listed endangered or threatened species would be adversely affected by suppression actions;
6. No significant impacts to state listed endangered or threatened species, or other native flora or fauna are expected from the proposed project;
7. *B.t.k.* and Gypchek® are extremely safe to use around humans and pets;
8. The public involvement, public notification, project monitoring procedures and mitigation measures that will be followed and implemented during the project will reduce the potential adverse environmental effects on areas treated and will minimize the risk of exposure to individuals visiting and residing in or near areas treated;
9. There are no apparent significant deleterious effects on the environment; and
10. The CVNP suppression project is within the scope of the FEIS and the decision announced in the ROD.

4.5. Mitigating Measures

Any treatment program will be conducted such that every aspect will proceed only if it can be done so safely. Pesticides will be applied in accordance with pesticide label specifications. Every effort will be made to restrict the application of pesticides to target areas and to minimize drift to off-site areas. Spray areas on federal land may be treated under an NPS contract or be included in a cooperative treatment plan with the ODA.

Pilots will be provided with digital and hardcopy maps of treatment areas. Delineated spray areas will be defined by Global Positioning System (GPS) technology used onboard

the aircraft. Pilots will be briefed daily on conditions and on any unusual features that require consideration or special attention. In addition to the application aircraft, a second observation craft with personnel from the USDA Forest Service will follow to monitor and guide spray activities.

A news release will be prepared to notify the public about any planned treatments. Signs will be posted in visitor centers and information sites around the park several weeks prior to any spraying. Information about suppression activities will be provided to anyone who requests it in person or by telephone. A telephone 'gypsy moth hotline' with regular updates on the progress of gypsy moth treatments in CVNP will be maintained during the treatment period. Maps of any treatment areas will be available for inspection at CVNP Headquarters in Brecksville and on the park's Internet site (<http://www.nps.gov/cuva>).

Coordination with the CVEEC and CVNP Interpretation & Visitor Services staff will help minimize the effects of treatment on outdoor education programs. Whenever possible, treatments will be scheduled to not conflict with outdoor programs. Additionally, alternative indoor programming will be scheduled whenever possible. Participants in CVNP and CVEEC educational and recreational programs and those requesting permits for park facilities during the month of May will be informed of possible treatment actions.

4.6. Program Monitoring

As part of an ongoing IPM program, annual monitoring of forests for defoliation and gypsy moth population status will be conducted to assess the efficacy of treatments and the need for future treatments. Aerial surveys each summer will document any defoliation that may occur in the park. Egg mass surveys performed the following fall will provide a measure of the effectiveness of a spray program when compared to data from earlier egg mass surveys.

The management of the gypsy moth is an ongoing process. The decision to treat areas of the park in the future will be made annually as outlined in Alternative 2 of this Management Plan/EA using the methods described in Appendix 3. The total treatment area will change from year to year, and it is expected that no treatments will be necessary in some years.

5. AGENCIES AND PERSONS CONSULTED

Bradley P. Onken, Entomologist
USDA, Forest Service
180 Canfield Street
Morgantown, WV 26505

Garree Williamson, Resource Management Specialist
Dave Humphrey, Supervisory Landscape Architect
Meg Plona, Biologist
Lisa Petit, Wildlife Biologist
USDI, National Park Service
Cuyahoga Valley National Park
15610 Vaughn Road
Brecksville, Ohio 44141

Michael Gallagher, Regional IPM Coordinator
USDI, National Park Service
1709 Jackson St.
Omaha, Nebraska 68102

Michael Madell, Regional Environmental Coordinator
USDI, National Park Service
700 Rayovac Drive, Suite 100
Madison, Wisconsin 53711

William J. Kurey, Acting Supervisor
USDI, Fish and Wildlife Service
Ecological Services
6950 Americana Parkway, Suite H
Reynoldburg, Ohio 43068

6. *PREPARER*

Kevin Skerl, Ecologist
USDI, National Park Service
Cuyahoga Valley National Park
15610 Vaughn Road
Brecksville, Ohio 44141

7. *REFERENCES*

Iftner, D.C., Shuey, J.A., and J.V. Calhoun. 1992. Butterflies and skippers of Ohio. Ohio Biological Survey Bulletin 9(1) xii + 212 p.

Liebhold, A. Thorpe, K., Ghent, J., and B. Lyons. 1993. Egg mass sampling for decision-making. Gypsy Moth News 33: 16-21.

Mosure-Fok and Syrakic, Company Ltd., Land Design/Research, Inc., and Jack McCormick and Associates, Inc. 1975. Cuyahoga Valley 1975. Columbus: Ohio Department of Natural Resources.

Stoutamire, W. P. 2000. Personal communication on 1-11-00. University of Akron.

USDA, Forest Service. 1995. Gypsy Moth Management in the United States, A Cooperative Approach: Final Environmental Impact Statement. 5 volumes.

USDA, Forest Service. 1999. Biological evaluation of gypsy moth at Cuyahoga Valley National Recreation Area, 1999. Unpublished report, 11 pp.

USDI, National Park Service. 1977. General Management Plan, Cuyahoga Valley National Recreation Area, Ohio.

USDI, National Park Service. 1988. Management Policies. Washington: National Park Service.

USDI, National Park Service. 1991. NPS-77: Natural Resources Management Guideline. Washington: National Park Service.

USDI, National Park Service. 1999a. Resources Management Plan, Cuyahoga Valley National Recreation Area, Ohio.

USDI, National Park Service. 2000a. Gypsy Moth Egg Mass Survey Report – 1999, Cuyahoga Valley National Recreation Area, Ohio. Unpublished report, 17 pp.

USDI, National Park Service. 2000b. Final Environmental Assessment - Gypsy Moth Suppression Program, 2000. Cuyahoga Valley National Recreation Area, Ohio.

USDI, National Park Service. 2000c. Butterfly Species List for Cuyahoga Valley National Park. Unpublished monitoring data.

Appendix 1. Summary of Gypsy Moth Public Scoping and Outreach, Cuyahoga Valley National Park, Ohio (1999-2000)

Representatives from Cuyahoga Valley National Park participated in a variety of gypsy moth-related public scoping activities in 1999-2000. These included community meetings and open houses that were hosted by surrounding communities, meetings with other agencies, and scoping letters requesting input on management options. These activities are detailed below.

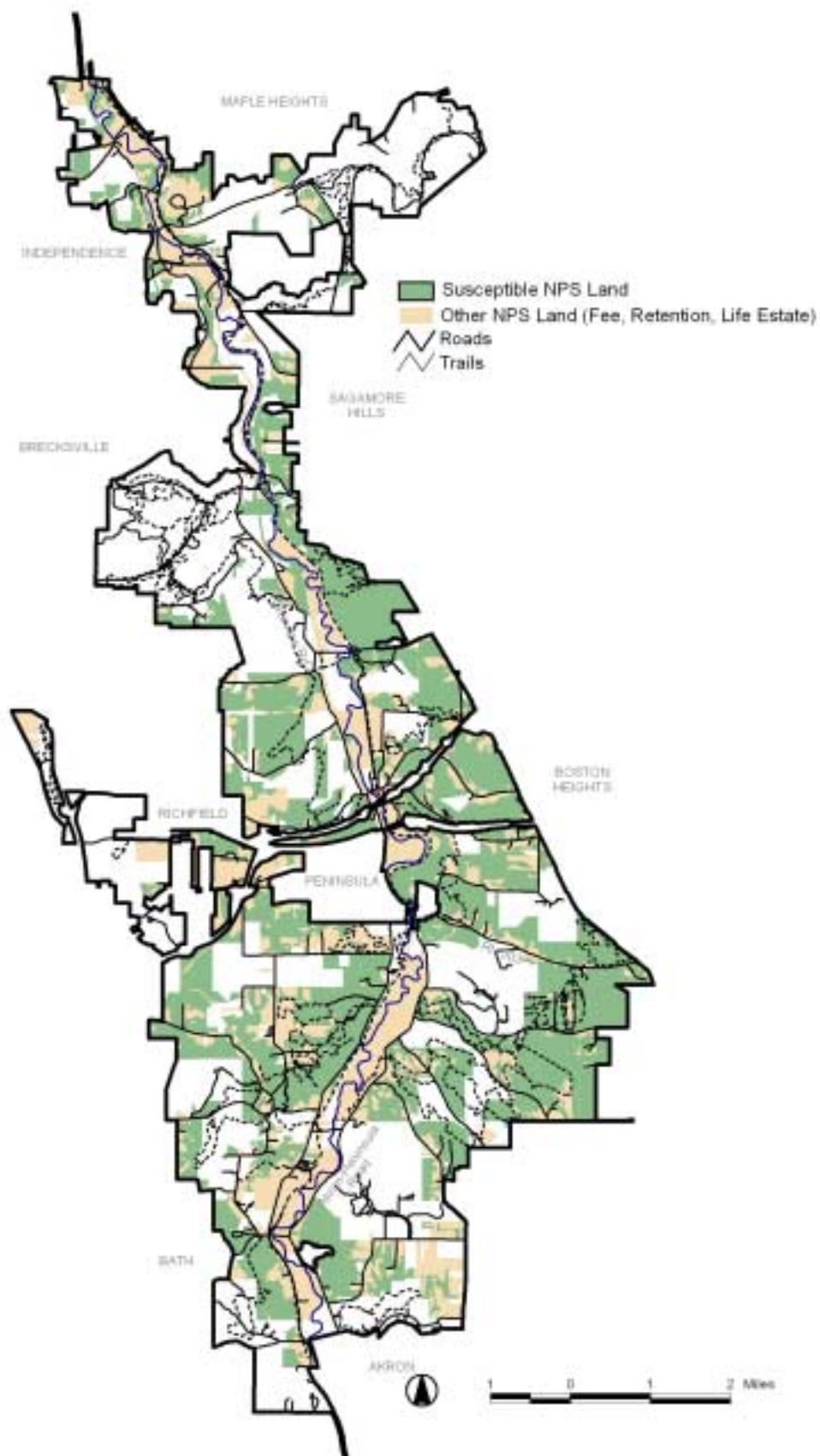
<u>Date</u>	<u>Activity</u>
June 24, 1999	Public Meeting. Hosted by the Village of Peninsula at the Peninsula Public Library, attended by 100+ people. Question and Answer period.
July 7, 1999	Cuyahoga Valley Communities Council Meeting. Held at the Brecksville Community Center. Discussions with representatives from many municipalities and federal and state agencies.
July 14, 1999	Open House. Hosted by Sagamore Hills Township at the Sagamore Hills Safety Center. A Gypsy Moth Task Force comprised of 20 individuals from federal, state and county agencies and local residents was developed under the auspices of the Cuyahoga Valley Communities Council.
August 17, 1999	Gypsy Moth Task Force Meeting. Held at the Brecksville Community Center. Updates on surveys and other issues of concern.
August 23, 1999	Planning Meeting. Cuyahoga Valley NRA. Meeting with the USDA Forest Service, Cleveland Metroparks, Metro Parks Serving Summit County, and the Ohio Dept. of Agriculture to discuss coordination issues and information needs.
September 9, 1999	Planning Meeting/Training. Cuyahoga Valley NRA. Meeting and training with Forest Service to design and implement egg mass survey plan.
September 28, 1999	Gypsy Moth Task Force Meeting. Held at the Brecksville Community Center. Updates on surveys and other issues of concern.
December 2, 1999	Gypsy Moth Task Force Meeting. Held at the Brecksville Community Center. Updates on surveys and other issues of concern.
January 13, 2000	Gypsy Moth Planning Meeting. Cuyahoga Valley NRA. Meeting with Forest Service and Ohio Dept. of Agriculture to discuss coordination and planning issues.
January 20, 2000	Gypsy Moth Task Force Meeting. Held at the Brecksville Community Center. Updates on surveys and other issues.
March 1, 2000	Notice of Availability. Ads announcing the availability of the draft environmental assessment (2000 suppression project) for public review were placed in local newspapers. Ads appeared in the Akron Beacon Journal (March 1) and The Plain Dealer (March 2). Approximately 180 press releases with the same information were mailed out to local media the previous week. The EA was made available at park headquarters and also placed on the Cuyahoga Valley NRA web pages for downloading. Written comments were accepted through March 31.

<u>Date</u>	<u>Activity</u>
March 1, 2000	Public Open House. Held at the Richfield Fellowship Hall. Public meeting to present the treatment proposals of the Ohio Dept. of Agriculture and the National Park Service. Information on how to obtain and comment on the Cuyahoga Valley NRA draft environmental assessment is made available. Approximately 30 people attended.
March 2, 2000	Public Open House. Held at the Brecksville Community Center. Public meeting to present the treatment proposals of the Ohio Dept. of Agriculture and the National Park Service. Information on how to obtain and comment on the Cuyahoga Valley NRA draft environmental assessment is made available. Approximately 30 people attended.
April 6, 2000	2000 Environmental Assessment/FONSI Released. The decision documents for the spring 2000 suppression project are signed, selecting Alternative 2: Suppression in Critical Areas.
April 13, 2000	Gypsy Moth Task Force Meeting. Held at the Brecksville Community Center. Updates on suppression projects by ODA and NPS are presented.
April 18, 2000	Cuyahoga Valley Communities Council Meeting. A short presentation on the suppression project for CVNP is made.
April 21, 2000	Press Release. Notification of the upcoming spray program is sent to approximately 180 media contacts.
June 22, 2000	Gypsy Moth Task Force Meeting. Held at the Brecksville Community Center. Follow-up discussions on the suppression projects.
July 24, 2000	Gypsy Moth Task Force Meeting. Held at the Brecksville Community Center. Discussions on coordination and plans for the 2000 round of surveys and suppression projects.
September 8, 2000	Press Release and Scoping Letters. A press release is sent to approximately 75 media contacts requesting public input on the Gypsy Moth Management Plan/EA. A similar letter is sent the same week to 33 agencies and organizations (see below).
September 26, 2000	Gypsy Moth Task Force Meeting. Held at the Brecksville Community Center. Discussions on egg mass surveys and next year's treatment outlook. Input is solicited for the planned Gypsy Moth Management Plan/EA.
November 11, 2000	Gypsy Moth Task Force Meeting. Held at the Brecksville Community Center. Discussions on preliminary egg mass surveys. The upcoming availability of the draft Gypsy Moth Management Plan/EA is announced.
November 17, 2000	Notice of Availability. Ads announcing the availability of the draft Gypsy Moth Management Plan/EA for public review were placed in local newspapers. Ads appeared in the Akron Beacon Journal and The Plain Dealer. Approximately 200 press releases with the same information were mailed out to local media the previous week. The Plan/EA was made available at park headquarters and also placed on the Cuyahoga Valley NRA web pages for downloading. Written comments were accepted through December 18, 2000.

Scoping letters detailing the gypsy moth issue at Cuyahoga Valley NRA and requesting input on potential issues and management alternatives was sent to the following agencies and organizations:

Animal Protection Institute
Boy Scouts of America
Blossom Music Center
Brandywine Golf Course
Cleveland Metroparks
Cleveland Museum of Natural History
Cuyahoga Valley Association
Cuyahoga Valley Scenic Railroad
The Fund For Animals
Greater Akron Audubon Society
Hale Farm and Village
The Humane Society of the United States
In Defense of Deer
Metro Parks, Serving Summit County
Ohioans for Animal Rights
Ohio Canal Corridor
Ohio and Erie Canal Corridor Coalition
Ohio Department of Agriculture
Ohio Department of Natural Resources – Division of Natural Areas and Preserves
Ohio Department of Natural Resources – Division of Parks and Recreation
Ohio Department of Natural Resources – Division of Wildlife
Ohio Environmental Protection Agency
Ohio Historical Society
The Ohio Lepidopterists
The Ohio State University, Department of Entomology
Phillis Wheatley Association
Sierra Club - Portage Trail Group
U.S. Environmental Protection Agency
U.S. Forest Service
U.S. Fish & Wildlife Service
Western Reserve Girl Scout Council
Western Reserve Historical Society
Woodlake Environmental Field Station- Cleveland State University

Appendix 2. Forests on federal land susceptible to gypsy moth defoliation - Cuyahoga Valley National Park, Ohio.



Appendix 3.

Identifying Critical Areas for Gypsy Moth Suppression - Cuyahoga Valley National Park, Ohio

A. INTRODUCTION

The decision to suppress gypsy moth populations through biological pesticide applications will be made each year by park managers. The areas that will be considered for treatment, the criteria used for prescribing treatment in those areas and some important implementation details are outlined in this Appendix.

B. GYPSY MOTH MANAGEMENT AREAS

The gypsy moth has become established in CVNP and will be an issue of concern for years to come. More than 11,000 acres of susceptible forest under NPS ownership in CVNP may occasionally be susceptible to gypsy moth defoliation. In some years, high gypsy moth population levels across the park could justify treating almost all of this acreage to prevent defoliation (e.g., 97% of these areas qualified in 2000) (USDI-NPS, 2000a). However, prescribing treatments over large areas is not desirable because of potential consequences of widespread pesticide use (e.g., impacts on non-target fauna, reducing the effectiveness of natural controls) and growing economic costs.

Rather than treat all areas susceptible to defoliation each year, park managers will prioritize and protect areas that would be most significantly affected by gypsy moth defoliation. The most critical natural, cultural, recreational and scenic values of the park are best protected by focusing treatments on previously defoliated areas, areas of significant recreational value, and areas adjacent to private lands being treated by the Ohio Department of Agriculture. Susceptible areas that satisfy one or more of these designations will be considered for treatment. Susceptible areas outside of these priority areas would not be treated under this plan.

Previously Defoliated Areas

Areas that have been defoliated at least once in the previous 3 years will be considered a priority for possible treatment. Most healthy trees can withstand an initial defoliation event, with minimal risks of tree mortality. Repeated defoliation events can lead to more significant tree mortality risks as tree health and vigor declines and susceptibility to other pests, diseases and stresses increases. Tree mortality is considered the most critical impact of the gypsy moth, as this impact has long-term consequences: loss of habitat, undesirable ecological changes, adverse scenic impacts and hazardous trees. The effects of a single defoliation event can continue to affect tree health and vigor for 2-3 years.

The total area considered for treatment under this criterion will fluctuate with defoliation levels. For example, the area of federal land defoliated at least once between 1998-2000 totals approximately 2500 acres (Figure 1).

Significant Recreational Areas

Significant recreational use areas will be considered a priority for treatment. Gypsy moth activity, defoliation effects, and tree mortality in these areas may have the most significant negative effects on the recreational and scenic values of the park and the health and safety of visitors and employees.

Significant recreational areas are characterized by the presence and concentration of developed trail systems and recreational facilities. The major trail systems and facilities considered critical for protection from gypsy moth impacts include but are not limited to the Ohio and Erie Canal Towpath Trail, the Virginia Kendall Ledges/Octagon area, Happy Days Visitor Center, Boston Run Trail, Salt Run Trail, the Oak Hill Day-Use Area, the Old Carriage Trail, the Cuyahoga Valley Environmental Education Center (CVEEC), Stanford Youth Hostel and the Hale Farm Connector Trail (Figure 2). These areas contain approximately 2000 acres of susceptible forests.

Buffer Areas to Private Lands

Buffer areas on NPS land may be treated when adjacent private lands qualify for treatment under the ODA treatment program and the ODA specifically requests the buffer. The park is committed to a goal of cooperating with other agencies and landowners to suppress gypsy moth populations. An approximate buffer area of 100-200 feet from adjacent non-NPS land onto NPS land is needed to help ensure that non-NPS lands that are treated receive adequate protection from re-invasion by gypsy moths due to their limited dispersal ability.

The total acreage of these areas will fluctuate depending upon the status of gypsy moth populations on private lands and the applications for treatment received by the ODA. It is expected that the total buffer area treated will be larger following years with extensive defoliation and much less following years when defoliation is not prevalent. For example, following the significant defoliation in 1999, approximately 1100 acres of buffer areas were treated in 2000. These areas may be treated by the NPS in its spray program, or permission may be given to the ODA to treat these federal areas.

C. GYPSY MOTH MONITORING

Natural resource managers in CVNP began an annual park-wide gypsy moth egg mass survey in response to a serious outbreak of gypsy moths in 1999. In cooperation with the Forest Service, egg mass surveys will be conducted in October-November each year to assess the current status of gypsy moth populations. Forests on federal land within the park susceptible to defoliation will be surveyed. Additionally, the Forest Service will conduct an aerial survey to document defoliation in the park in July-August each year.

Egg Mass Survey Design

Susceptible forests on federal land were divided into 47 survey blocks based on geographic continuity and ease of implementation (Figure 3). Survey blocks range in size from 16 to 754 acres. These survey blocks form the full extent of the potential survey area each year. Survey blocks may occasionally be adjusted or split into several blocks to increase the ease of implementation and effectiveness of the survey or to adjust for changes in land ownership.

The scope of the monitoring project will fluctuate each year with a primary focus on the areas previously defoliated, significant recreational areas, and areas treated earlier that year. For example, all survey blocks were assessed in 1999 (11,329 acres; 575 survey plots) to establish a baseline assessment of gypsy moths across the park. In fall 2000, a subset of these areas (8650 acres; 451 plots) will be surveyed.

The number of survey plots assigned to each survey block is based upon total area using this formula: four plots for the first 25 acres, one additional plot for each 25 acres of area thereafter. New plot locations are assigned each year. The number of plots assigned is rounded to the nearest 25-acre unit. Survey plots will be randomly assigned to points across a 100m x 100m sampling grid. Occasional adjustments to the plot distribution may be made before going to the field to increase the overall uniformity of the survey. Occasionally, some blocks may be surveyed with less intensity for screening purposes to determine whether a full survey is needed in that area that year.

A standard fixed radius 1/40th-acre egg mass survey protocol recommended by the Forest Service was conducted in all survey plots (Liebhold et al. 1993). Information gathered included the total number of observed egg masses, the proportion of new egg masses, and five random measurements of egg mass length. Information on tree species and tree diameter at breast height is also collected.

Data Review and Analysis

The data collected will be used to calculate the total number of new egg masses per acre (new egg masses/acre = total observed egg masses x proportion new egg masses x 40) for each survey plot. Mean egg mass length was also calculated. Plot data for each survey block were pooled to obtain a mean new egg masses/acre figure (egg mass density) and mean egg mass length for each block.

Survey results will be entered into a geographic information system (GIS) for spatial analysis. A comparison with other data layers including defoliation patterns and past treatment history will be performed to help identify areas needing treatments. The Forest Service will complete a biological evaluation based on egg mass survey results each year and provide additional guidance on the need for treatments.

D. CRITERIA USED FOR PRESCRIBING TREATMENT

The decision on which of the above Gypsy Moth Management Areas will be treated each year is dependent upon a set of criteria, including current defoliation risk, tree mortality risk, the history of treatments in the area, and the presence of sensitive resources. How these criteria apply to each area and how they are prioritized may change in areas from year to year in response to changing gypsy moth population levels and distribution, treatment patterns and new information, but the general guidance for identifying the need for suppression and setting priorities for treatment is presented in this section.

Defoliation Risk

Survey blocks must have a minimum mean egg mass density of 250 egg masses/acre to be considered for treatment and areas with densities greater than 1000 egg masses/acre will be considered a priority for treatment.

Gypsy moth egg mass density information collected during annual monitoring is an indicator of defoliation risk. A common threshold for treatment primarily for nuisance-level control in residential areas is 250 egg masses/acre. Defoliation can begin to have significant aesthetic and ecological impacts at higher egg mass densities. For example, in areas with a density of 1000 egg masses/acre, defoliation levels of 40% are predicted (Liebhold et al. 1993). Predicted defoliation increases rapidly as egg mass densities increase above 1000/acre, with levels approaching 100% defoliation at egg mass densities of 3000/acre.

Egg mass density is the first indicator used to identify areas of the park that may require treatment.

Tree Mortality Risk

Areas showing high or moderate tree mortality risks will be considered priorities for treatment. Especially in years when defoliation risk is high across many areas, high and moderate mortality risks will be considered higher priorities for treatment than defoliation risk alone.

While egg mass density is the primary indicator of expected defoliation levels, tree mortality is a more significant ecological concern. Additional factors such as past defoliation history and egg mass length can be used along with egg mass density to predict tree mortality risk.

Egg mass survey results will be used to estimate tree mortality risks using a model developed by the Forest Service. The model used in this analysis assumes a high level of uncertainty, but is an attempt to use the best available data and knowledge to categorize potential risks. The model thresholds and levels of tree mortality risk may change year to year as gypsy moth population levels and other environmental conditions (e.g, drought,

other pests and diseases) fluctuate. The specific model that was used to predict tree mortality risk for spring 2000 is illustrated in Figure 4.

The basic assumptions of this model are:

- *Mortality risk increases with repeated defoliation events:* Mortality after one year of defoliation is generally relatively low, depending upon other environmental variables (e.g., drought, disease), but increase dramatically with subsequent defoliation.
- *Mortality risk increases with increasing egg mass density:* Generally, defoliation (and the associated stress) increases with increasing egg mass density.
- *Mortality risk increases with larger egg masses:* Egg masses can contain between several hundred to 1000 eggs. Generally, larger egg masses will produce more caterpillars resulting in increased defoliation (and associated stress). Additionally, small egg masses may be indicative of declining or stressed gypsy moth populations.

This model separates areas into three categories of mortality risk: High Risk, Moderate Risk and Low Risk. Expected mortality risks are generally considered high primarily in areas that have already been defoliated. Moderate risks can be found in defoliated areas or in non-defoliated areas with a high density of large egg masses.

History of Previous Treatments

Treatments using *B.t.k* in the same area in consecutive years will be minimized whenever practicable. In areas where *B.t.k* has been used in the previous year to suppress gypsy moth populations, additional applications of this pesticide could begin to have cumulative negative affects on some native lepidopteran populations. While it is expected that after one treatment, any affected species would recover to pre-treatment levels within 1-2 years of treatment through recolonization and reproduction, repeated *B.t.k.* applications could affect this recovery period.

In areas that were treated with *B.t.k.* the previous year, an assessment of the effectiveness of the treatment will be made by comparing pre- and post-treatment egg mass densities and size. Retreatment with *B.t.k.* would only be prescribed in areas where gypsy moth suppression was not very effective as indicated by egg mass size and density, defoliation patterns or tree mortality risk. Repeated treatments in the narrow buffer areas may also occur as requested by the ODA. Gypchek® may be used instead of *B.t.k.* in previously treated areas if available.

Presence of Sensitive Resources

Gypchek® will be used in sensitive areas requiring treatment if available.

Some park areas that qualify for treatment may be considered sensitive resources in respect to treatments with *B.t.k.*, due to potential impacts on non-target Lepidoptera.

These may include butterfly monitoring areas, locations of federal or state-listed animals (particularly lepidopterans), locations of state-listed plants with lepidopteran pollinators, areas of habitat diversity that may harbor a diverse lepidopteran fauna (i.e., a mixture of open areas, woodland, and wetlands), and areas important for environmental education and scientific research.

Some examples of these areas are found in portions of the Virginia Kendall area, the CVEEC campus, portions of the Oak Hill Day Use Area, the Hale Farm Connector Trail area and Terra Vista. The Virginia Kendall unit possesses habitat diversity, rare plants with lepidopteran pollinators, a nesting site of the state endangered Hermit Thrush, and significant educational value due to the presence of the Happy Days Visitor Center. This area also contains the campus of the Woodlake Environmental Field Station, a significant research and education area. Other areas around the CVEEC, Oak Hill, and the Hale Farm Connector Trail possess similar habitat diversity, educational value, and rare plant occurrences. Terra Vista contains a long-term butterfly monitoring transect that is part of a state-wide effort to characterize butterfly population status and trends. New information may identify other park resources as sensitive areas.

If Gypchek® is not available, some sensitive areas that qualify for treatment may still be treated with *B.t.k.* to avoid undesirable gypsy moth impacts (e.g., areas of CVEEC to prevent high tree mortality). Some other sensitive areas may not be treated if the potential impacts of *B.t.k.* use, while small, are unacceptable (e.g., Terra Vista butterfly monitoring area). Each sensitive area will be examined individually to make this determination.

E. IMPLEMENTATION

Coordination with Other Agencies

Park managers will continue to coordinate closely with other governmental agencies on gypsy moth monitoring and management in and around CVNP.

The Forest Service will provide technical assistance for monitoring and planning efforts in the park and will characterize the health and status of gypsy moth populations and the need for gypsy moth suppression in a Biological Evaluation each year.

The ODA is responsible for the monitoring and suppression of gypsy moth populations on non-NPS lands in and around the park. The ODA will help identify buffer zone treatment needs and will coordinate any integrated suppression projects.

In years when treatment is planned, suppression project plans will be submitted to the U.S. Fish and Wildlife Service for federal endangered species review and consultation as required under Section 7 of the Endangered Species Act. Plans will also be submitted to the Ohio Department of Natural Resources, Division of Natural Areas and Preserves (ODNAP) for review. ODNAP maintains the Natural Heritage Database that contains information on the distribution of rare plants and animals in the state.

Pesticide Applications

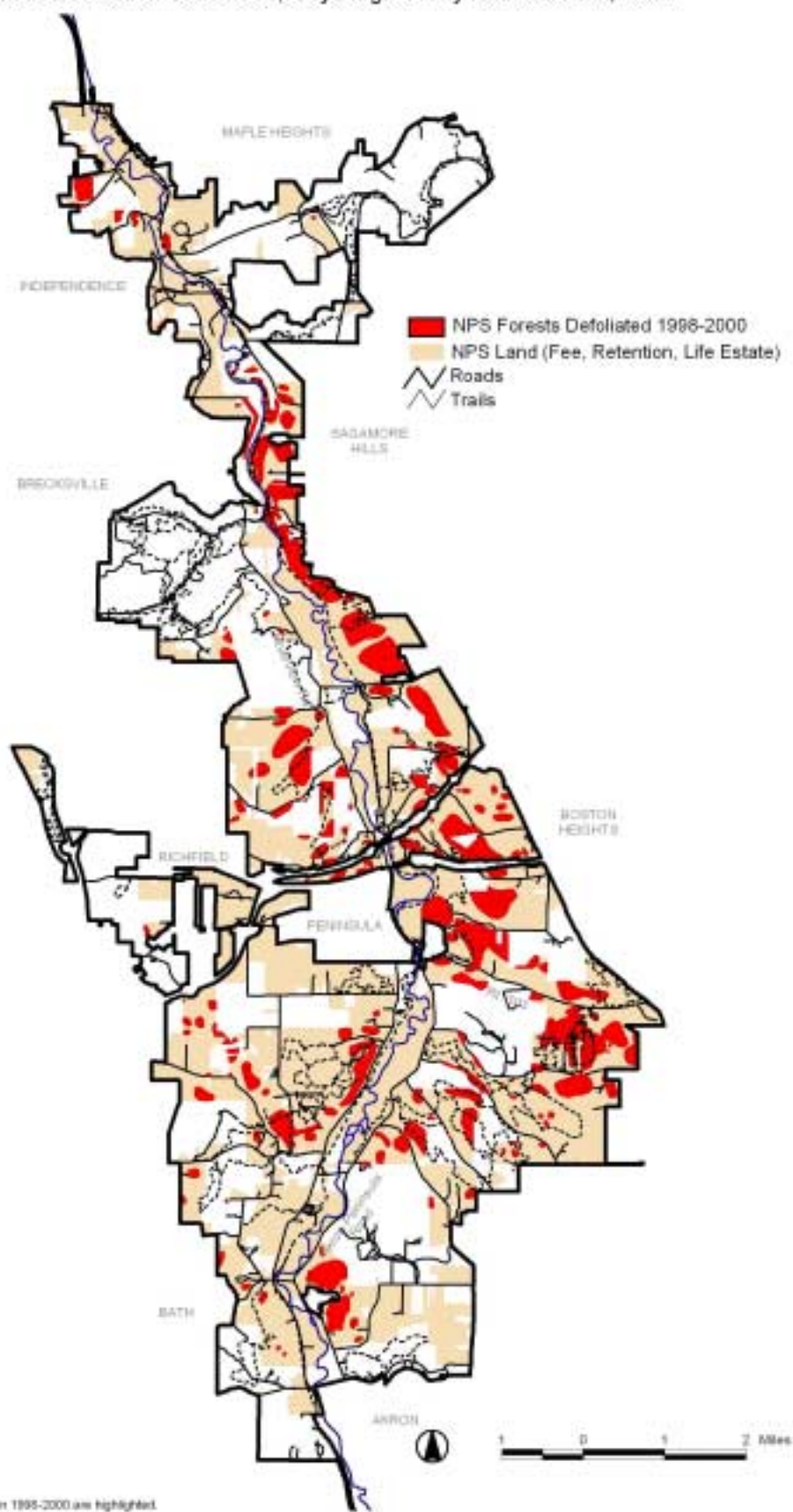
The minimum amount of treatment needed to achieve protection goals will be prescribed. In most cases, a single application of *B.t.k.* or two applications of Gypchek® will be sufficient to achieve defoliation prevention. Typical application rates of *B.t.k.* (36 BIUs/acre) or Gypchek® (2×10^{11} occlusion bodies/acre) would be used in any treatments. Low-flying aircraft (fixed wing or helicopters) would apply these pesticides to tree canopies during separate flights during the 2nd and 3rd larval instars. Pesticides would be applied just after the emergence of the gypsy moth caterpillar in early May.

In some areas where the gypsy moth population is very healthy as indicated by egg mass sizes and numbers, the Forest Service may recommend that an additional *B.t.k.* application 5-7 days after the initial treatment is needed to ensure successful suppression. This guidance will be offered in their annual biological evaluation.

Public notification

Each year that suppression activities are planned, the NPS will issue a press release before treatments begin to notify the public of the planned action. Details on the planned treatment project will be made available to the public through press releases, documents posted at park headquarters and on the park's Internet site (<http://www.nps.gov/cuva>). See Section 4.5 of the Management Plan/EA for more details.

Figure 1. Gypsy Moth Defoliation 1998-2000, Cuyahoga Valley National Park, Ohio



Note: Areas defoliated at least once in 1998-2000 are highlighted.

Figure 2. Significant Recreational Use Areas, Cuyahoga Valley National Park, Ohio

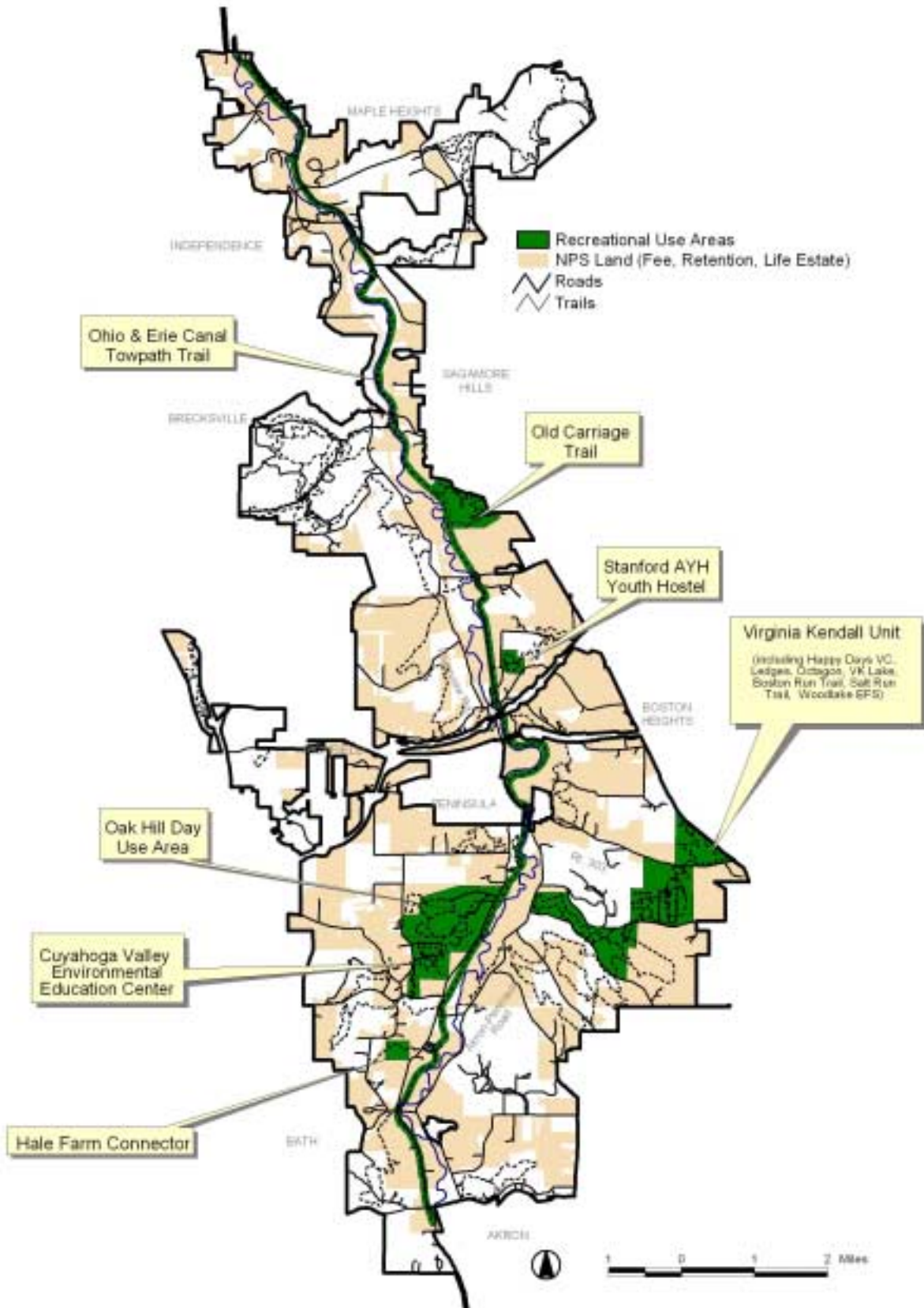
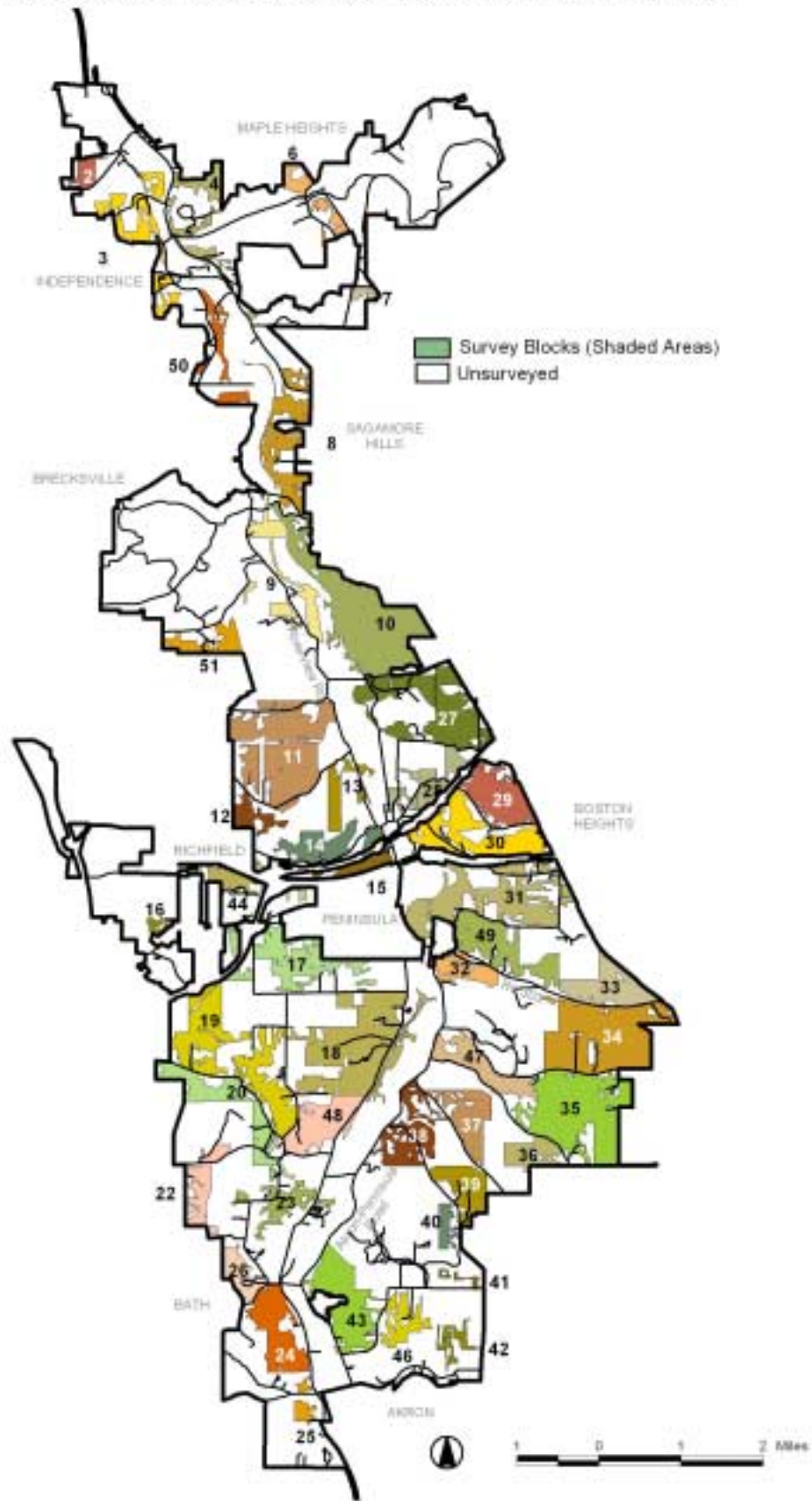
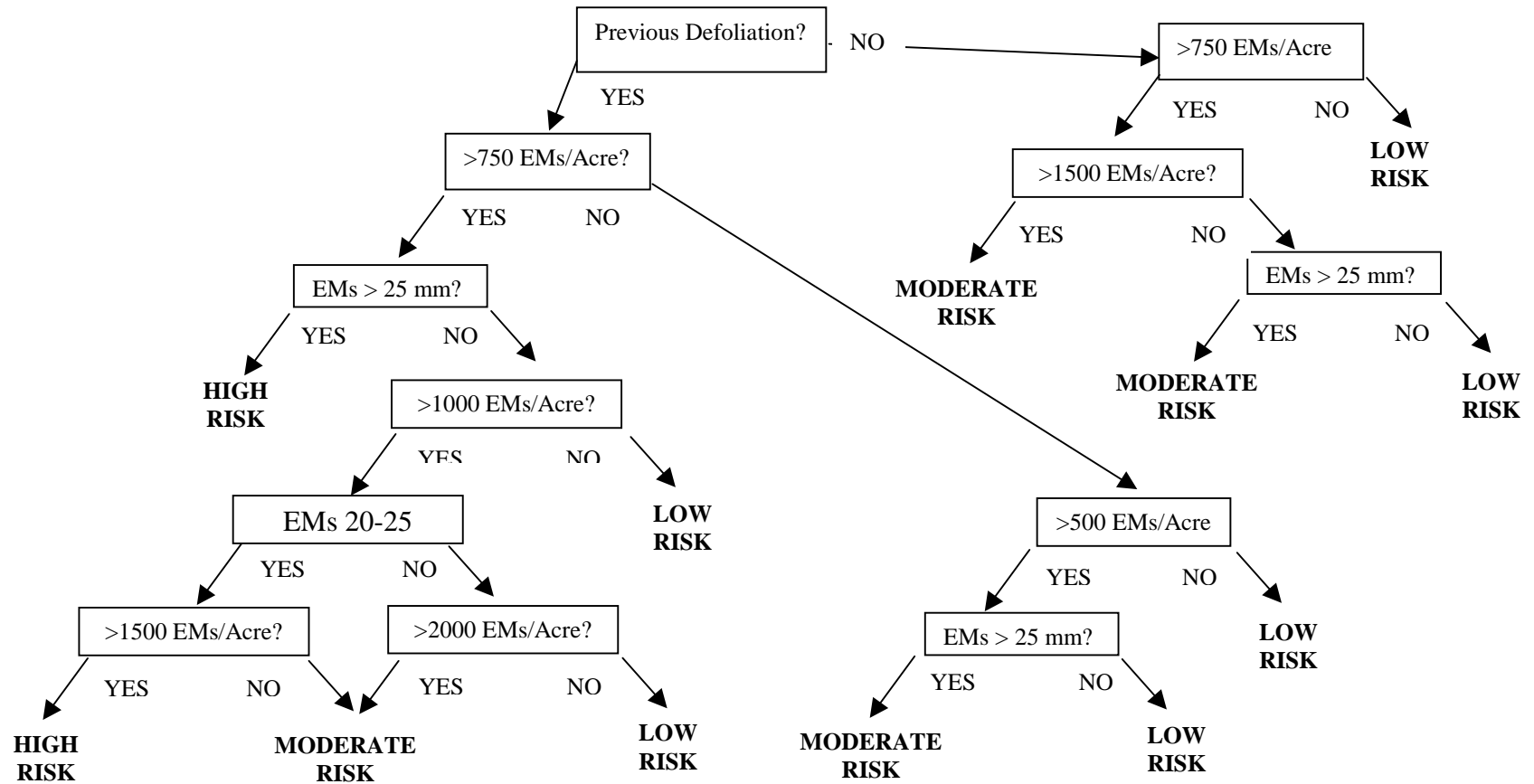


Figure 3. Gypsy Moth Egg Mass Survey Blocks, Cuyahoga Valley National Park, Ohio



Note: Shading differences are to help distinguish individual survey blocks only.

Figure 4. Model of tree mortality risk due to gypsy moth defoliation, Cuyahoga Valley National Park, Ohio – 1999.



Source: USDA Forest Service, with revisions. EMs = Egg Masses. Note: EM thresholds and mortality levels in model will be revised each year based on current conditions (i.e., gypsy moth populations, drought conditions, presence of other pests & diseases).

Appendix 4. Butterfly Species List for Cuyahoga Valley National Park, Ohio (USDI, National Park Service 2000c).

<u>Common Name</u>	<u>Scientific Name</u>	<u>Habitat</u>
1 Acadian Hairstreak	<i>Satyrrium acadicum</i>	wetlands
2 American Copper	<i>Lycaena phlaeas americana</i>	old fields
3 American Painted Lady	<i>Vanessa virginiensis</i>	open areas
4 Baltimore	<i>Euphydryas phoeton</i>	fens, open areas
5 Banded Hairstreak	<i>Satyrrium calanus falacer</i>	oak forest
6 Black Dash Skipper	<i>Euphyes conspicuus</i>	fens, open areas
7 Black Swallowtail	<i>Papilio polyxenes</i>	old fields
8 Buckeye	<i>Junonia caenia</i>	open areas
9 Cabbage White	<i>Pieris rapae</i>	open areas
10 Clouded Sulphur	<i>Colias philodice</i>	open areas
11 Cloudy Wing	<i>Thorybes sp.</i>	oak forest margins
12 Comma	<i>Polygonia comma</i>	deciduous forest
13 Common Wood Nymph	<i>Cercyonis pegala F.alope</i>	open areas
14 Coral Hairstreak	<i>Harkenclenus titus</i>	open areas
15 Delaware Skipper	<i>Atrytone delaware</i>	open areas
16 Dun Skipper	<i>Euphyes vestris metacomet</i>	open areas
17 Dusted Skipper	<i>Atryonopsis hianna</i>	open areas
18 Eastern Tailed Blue	<i>Everes comyntas</i>	open areas
19 Eastern Tiger Swallowtail	<i>Papilio glaucus</i>	deciduous forest
20 Edwards' Hairstreak	<i>Satyrrium edwardsii</i>	oak savanna
21 European Skipper	<i>Thmelicus lineola</i>	open areas
22 Fiery Skipper	<i>Hylephila phyleus</i>	open areas
23 Great Spangled Fritillary	<i>Speyeria cybele</i>	open forests
24 Hoary Edged Skipper	<i>Achalarus lyciades</i>	open areas
25 Horace's Duskywing	<i>Erynnis horatius</i>	oak forest
26 Indian Skipper	<i>Hesperia sassacus</i>	grassy fields
27 Juvenal's Duskywing	<i>Erynnis juvenalis</i>	oak forest
28 Least Skipper	<i>Ancyloxpha numitor</i>	open areas
29 Leonard's skipper	<i>Hesperia leonardus leonadus</i>	open areas
30 Little Glassy Wing	<i>Pomeius verna</i>	old fields
31 Little Wood Satyr	<i>Megisto cymela</i>	shaded habitats
32 Meadow Fritillary	<i>Boloria bellona</i>	open areas
33 Milbert's Tortoise Shell	<i>Nymphalis milberti</i>	mesic woods
34 Monarch	<i>Danaus plexippus</i>	open areas
35 Mourning Cloak	<i>Nymphalis antiopa antiopa</i>	deciduous forest
36 Northern Broken Dash	<i>Wallengrenia egeremet</i>	old fields
37 Northern Cloudywing	<i>Thorybes pylades</i>	oak forest margins
38 Northern Golden Skipper (Hobomok)	<i>Poanes hobomok hobomok</i>	forest margins
39 Northern Pearly Eye	<i>Enodia anthedon</i>	deciduous forest
40 Orange Sulphur (Aalfa Butterfly)	<i>Colias eurytheme</i>	open areas
41 Painted Lady	<i>Vanessa cardui</i>	open areas
42 Pearl Crescent	<i>Phyciodes tharos</i>	open areas
43 Peck's Skipper	<i>Polites coras</i>	open areas
44 Question Mark	<i>Polygonia interrogationis</i>	deciduous forest
45 Red Admiral	<i>Vanessa atalanta rubria</i>	mesic woods
46 Red Spotted Purple	<i>Limenitis arthemis astyanax</i>	deciduous forest
47 Sachem Skipper	<i>Atalopedes campestris huron</i>	open areas
48 Silver Spotted Skipper	<i>Epargyreus clarus clarus</i>	clover, alfalfa

49	Silvery Blue	<i>Glaucopsyche lygdamus</i>	wood vetch
50	Silvery Checkerspot	<i>Chlosyne nycteis</i>	open areas
51	Sleepy Duskywing	<i>Erynnis brizo</i>	oak forest
52	Southern Cloudywing	<i>Thorybes bathyllus</i>	forest margins
53	Spicebush Swallowtail	<i>Papilio troilus</i>	deciduous forest
54	Spring Azure	<i>Celastrina ladon complex</i>	deciduous forest
55	Striped Hairstreak	<i>Satyrrium liparops</i>	open forests
56	Summer Azure	<i>Celastrina sp.</i>	deciduous forest
57	Viceroy	<i>Limenitis archippus archippus</i>	open areas
58	White Admiral	<i>Basilarchia arthemis arthemis</i>	deciduous forest
59	White-m Hairstreak	<i>Parrhasius m-album</i>	open areas
60	Wild Indigo Duskywing	<i>Erynnis baptisiae</i>	open areas
61	Zabulon skipper (Southern Golden)	<i>Poanes zabulon</i>	open forests

Appendix 5. Compliance Documents and Response to Agency Comments

Responses to U.S. Fish and Wildlife comments in memorandum dated December 21, 2000.

Comment 1. Mating disruption using disparlure is discussed in detail in the 1995 FEIS, from which this EA is tiered (USDA, Forest Service 1995, Volume II, page A-9). Research has shown that this technique is best suited for areas that contain less than 10 egg masses per acre. The Forest Service has concluded that this technique is only appropriate for certain eradication and 'slow the spread' projects; it is not recommended for suppression projects. CVNP is considered to be in the suppression zone as the gypsy moth has become established in the park over the last 10 years. As such, the use of disparlure was not considered appropriate for the park.

Comment 2. The effects of a temporary reduction in Lepidoptera in areas treated with *B.t.k.* is discussed in Section 4.3.1.4 of the EA and was considered in the analysis.

Appendix 6. Public Comments